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The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills

FINAL PROJECT REPORT

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The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills

James P. Greenan
Principal Investigator

Department of Vocational
and Technical Education
College of Education
University of Illinois
at Urbana-Champaign

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State Board of
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Education

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June, 1984

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Acknowledgements

A special acknowledgement is extended to all the area vocational center directors, students, and teachers who participated in this project. The project's success depended greatly upon their cooperation, assistance, and support. Their response was enthusiastic and conscientious.

Drs. L. Allen Phelps and Hercules C. Kazanas, Co-Project Directors, Department of Vocational and Technical Education, University of Illinois; and Dr. Peter Seidman, Contract Administrator, Illinois State Board of Education, Department of Adult, Vocational, and Technical Education provided support and assistance throughout the study. Jo Ann Powell, research assistant, provided excellent assistance in developing the resource directory. Their input and suggestions were appreciated.

Special attention is also extended to the project advisory committee members for their valuable suggestions and recommendations for the duration of the project. Each member was extremely helpful in the project phases that included reviewing materials, instruments, products, and reports. The project advisory committee included:

Dr. James A. Dunn, Director
Institute for Occupational Education
College of Education
Cornell University

Dr. John C. Ory, Coordinator
Examination Services
Instructional Resources
University of Illinois

Dr. Maurice Tatsuoka
Dept. of Educational Psychology
College of Education
University of Illinois

Kay Smoot, Resource Teacher
VOTEC
Catlin Road
Danville, Illinois

Mr. William Rosser, Counselor
Decatur Area Vocational
Center
Decatur, Illinois

James Facko, Mathematics
Teacher
Sauk Area Career Center
Robbins, Illinois

Dr. Brandon B. Smith, Director
Minnesota Research and Development Center for Vocational Education
Department of Vocational-Technical Education
University of Minnesota

Dr. Frank C. Pratzer
The National Center for Research in Vocational Education
Ohio State University

Dr. James D. Raths
CIRCE/CTE
College of Education
University of Illinois

Dr. James J. Hirstein
Secondary and Continuing Education
College of Education
University of Illinois

Additional thanks and appreciation are due to Lilian Del Barco and Selena Douglass for typing, proofing, and other secretarial tasks related to the production of this and other products of the project. Their conscientiousness, patience, efficiency, and enthusiasm helped make this study successful.

Table of Contents

Page

Acknowledgements i

Department of Adult, Vocational, and Technical Education Funding Agreement Number 1

Official Project Title 1

Project Director 1

Funded Agency 1

Location of Funded Agency 1

Time Period Covered 1

Final Report Abstract 2

Expenditure of Funds 3

Paid Participants in Activity 3

Product Abstract 5

Conference/Workshop Summary(ies) 9

Resource Listing 11

Accomplishments, Including Significant Findings 11

Major Activities and Events 12

Problems 17

Publicity 17

Resource Persons 18

Summations of Evaluation Data Collected 19

Statement of Impact 20

Conclusions and Recommendations 21

Staff Development 23

Other Activities 23

Materials Developed 24

Appendices 25

A. Department of Adult, Vocational, and Technical Education Funding Agreement Number: R-31-24-D-0222-470

B. Official Project Title: The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills

C. Project Director:
James P. Greenan, Associate Project Director and Principal Investigator
L. Allen Phelps, Co-Project Director
Hercules C. Kazanas, Co-Project Director

D. Funded Agency:
Department of Vocational and Technical Education
Office of Career Development for Special Populations
College of Education
University of Illinois

E. Location of Funded Agency: Champaign, Illinois 61820

F. Time Period Covered: July 1, 1983 - June 30, 1984

Final Report Abstract

Official Project Title: The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills.

Department of Adult, Vocational and Technical Education Funding Agreement Number: R-31-24-D-0222-470

Project Director: James P. Greenan, Associate Project Director and Principal Investigator; L. Allen Phelps, Co-Project Director; Hercules C. Kazanas, Co-Project Director

Funded Agency: Department of Vocational and Technical Education, Office of Career Development for Special Populations, College of Education, University of Illinois

Location of Funded Agency: 345 Education Building, 1310 South Sixth Street
Champaign, Illinois 61820

Time Period Covered: July 1, 1983 - June 30, 1984

Major Accomplishments of the Project:

1. Identified and selected the project advisory committee.
2. Identified and selected the population and sample.
3. Coordinated the "Generalizable Skills" project activities with the "Change Skills" project activities.
4. Developed the set of student self-ratings, teacher ratings, and performance test mathematics assessment instruments.
5. Field tested the generalizable mathematics assessment instruments.
6. Determined the reliability and validity of the assessment instruments.
7. Developed strategies and procedures for using the generalizable mathematics skills assessment instruments.
8. Produced the Generalizable Mathematics Skills User Manual, Generalizable Mathematics Skills Resource Directory, and Final Report.

Potential Impact on Vocational Education:

This project provided teachers and other school personnel with a set of practical instruments for assessing students' generalizable mathematics skills in the secondary vocational training programs in the State of Illinois. The instruments may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing their programs. Further, upon identifying students' mathematics skill levels, a basis may be provided on which to prescribe and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen vocational programs. In addition, the concept of generalizable mathematics skills could then be applied to planning, assessment, curriculum, instruction, and evaluation in students' individualized education programs. This project also contributed and impacted upon the program improvement programmatic emphasis concerning the "new basics" in vocational education.

Products Delivered: (Indicate titles, types, quantity, recipients and date of delivery)

1. Two (2) copies of Quarterly Progress Reports (October 1, 1983; January 1, 1984; and April 1, 1984).

2. Fifty (50) copies of the Generalizable Mathematics Skills User Manual delivered to DAVTE by June 30, 1984.

3. Fifty (50) copies of the Generalizable Mathematics Skills Resource Directory delivered to DAVTE by June 30, 1984.

4. Twenty (20) copies of the final report delivered to DAVTE by June 30, 1984.

H. Expenditure of Funds:

A budget revision was requested and approved during the month of January. The budget revision included a decrease from $26,125 and $3,152 to $23,224 and $2,912 in the salary and benefits of the principal investigator. The funds were used to create the research assistant position ($2,904 salary; $12 benefits), and increase the salary ($1,620 to $1,741) and benefits ($196 to $218) of the Clerk Typist III. In addition, due to the reprinting of the Executive Summary, the printing line-item was increased from $1,200 to $2,300. This modification represented an increase from the original amount requested from DAVTE. Other than the requested and approved budget revision, there were no discrepancies between the Illinois State Board of Education/Department of Adult, Vocational and Technical Education Funding Agreement amount and actual expenditures claimed.

I. Paid Participants in Activity:

Dr. James P. Greenan
Associate Project Director and Principal Investigator
Department of Vocational and Technical Education
Office of Career Development for Special Populations
University of Illinois

James P. Greenan is currently an assistant professor in the Department of Vocational and Technical Education at the University of Illinois. For the past five years he has been the research and development coordinator of the Office of Career Development for Special Populations. During 1983-84 Dr. Greenan served as the associate project director and principal investigator of the 'Generalizable Skills' project. He was responsible for all planning, administrative, operational, and evaluation activities of the project.

Dr. Greenan has extensive teaching, research, and service experiences at the local, state, regional, and federal levels. He has conducted several research studies, published numerous articles and reports, and given several presentations at professional conferences. His occupational work experiences, education and training, and research activities have focused on vocational/industrial education, career education, research, and special needs. Presently, Dr. Greenan is actively involved in several professional associations, such as, the American Vocational Association and the Council for Exceptional Children. He is currently president-elect of the Illinois Association of Vocational Education Special Needs Personnel.

Jo Ann Powell
Research Assistant
Department of Vocational and Technical Education
Office of Career Development for Special Populations
University of Illinois

Jo Powell was appointed 50% time in the 'Generalizable Skills' project from January 21 - June 30, 1984. Ms. Powell is a full-time doctoral student in the College of Education. Her responsibilities included assisting on several project activities, and specifically, planning, organizing, and producing the Generalizable Mathematics Skills Resource Directory.

inois State Board of Education

epartment of Adult, Vocational and Technical Education
esearch and Development Section

oduct Abstract

. Title of material Generalizable Mathematics Skills User Manual

. Date material was completed June 30, 1984

. Please check one: New material X Revised material ______ Field-tested material ______

. Originating agency Department of Vocational and Technical Education, College of Education

Address University of Illinois, 1310 S. Sixth St., Champaign, IL Zip Code 61820

. Name(s) of developer(s) Dr. James P. Greenan

Address Same as Above Zip Code Same

. Developed pursuant to Contract Number R-31-24-D-0222-470

. Subject Matter (Check only one according to Department of Education Code):

Code

______ 01 Agricultural Education
______ 03 Business and Office Education
______ 04 Distributive Education
______ 07 Health Occupations Education
______ 09 Home Economics Education
______ 10 Industrial Arts Education
______ 16 Technical Education
______ 17 Trade and Industrial Education
______ 22 Cooperative Education
______ Career Education
X Other (Specify) Comprehensive Vocational Education

8. Education Level:

______ Pre-K Thru 6
______ Post-Secondary
______ Administrator (Pre-Service)
______ 7-8
______ Adult
X 9-10
______ Teacher (Pre-service)
______ Other (Specify) ______
X 11-12

9. Intended for Use By:

X Student
______ Teacher Educator
X Classroom Teacher
X Guidance Staff
X Local Administrator
______ State Personnel
______ Other (Specify) ______

10. Student Type:

X Regular
X Limited-English Proficiency
X Disadvantaged
X Handicapped
______ Other (Specify) ______

11. Medium and Format of Materials:

X HARDCOPY
No. of pages ______
X Paper bound
___ Hard bound
___ Loose-leaf
Photos: Yes ______ No X
Diagrams: Yes X No ______

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___ B & W
___ Color
______ inches

___ FILM
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___ B & W
___ Color
______ mm

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___ Color

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No of frames ______
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___ Color
___ Audio
___ Carousel provided
___ Other packaging used
(Specify) ______________

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No of frames ______
___ B & W
___ Color
___ Audio

___ AUDIO

___ Automatic synch
___ ______ Hz
___ Manual cue
___ Reel
___ Cassette
___ Cartridge

___ OTHER

Specify:
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___ Not available
_X_ Loan copy available

Contact: Name Dr. James P. Greenan, OCDSP Phone (217) 333-2325
Address Department of Vocational and Technical Education
College of Education, University of Illinois Zip Code 61820

13. Copyright Restrictions:

Contact: Name (In the Public Domain) Phone (   ) ______
Address ______________ Zip Code ______

14 What level(s) of assistance is required to provide implementation of this outcome?

_X_ awareness
_X_ understanding
_X_ deciding
_X_ implementing

15. Are Consultive/Inservice (or staff development) available? Yes _X_ No ___

Contact: Illinois State Board of Education
Department of Adult, Vocational and Technical Education
Research and Development Section, E-426
100 North First Street
Springfield, IL 62777
(217) 782-4620

16 General Description (State the general objective and suggested method of use. Summarize the content and tell how it is organized. Write the description so that it can be used to promote the material. Continue on back of this sheet or on another sheet, if necessary.)

17 Person Completing this Abstract Dr. James P. Greenan

Full Address
Office of Career Development for Special Populations
Department of Vocational and Technical Education
College of Education
345 Education Building
University of Illinois
1310 S. Sixth Street
Champaign, Illinois
Zip 61820

16. General Description:

This product will provide teachers and other school personnel with a set of practical instruments for assessing students' generalizable mathematics skills in the secondary vocational training programs in the State of Illinois. The instruments may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing their programs. Further, upon identifying students' mathematics skill levels, a basis will be provided on which to prescribe and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen vocational programs. In addition, the concept of generalizable mathematics skills could then be applied to planning, assessment, curriculum, instruction, and evaluation in students' individualized education programs.

inois State Board of Education

epartment of Adult, Vocational and Technical Education
esearch and Development Section

oduct Abstract

Title of material Generalizable Mathematics Skills Resource Directory

. Date material was completed June 30, 1984

. Please check one: New material X Revised material ____ Field-tested material ____

. Originating agency Department of Vocational and Technical Education, College of Education

Address University of Illinois, 1310 S. Sixth St., Champaign, IL Zip Code 61820

. Name(s) of developer(s) Dr. James P. Greenan

Address Same as Above Zip Code Same

. Developed pursuant to Contract Number R-31-24-D-0222-470

. Subject Matter (Check only one according to Department of Education Code):

Code

____ 01 Agricultural Education
____ 03 Business and Office Education
____ 04 Distributive Education
____ 07 Health Occupations Education
____ 09 Home Economics Education
____ 10 Industrial Arts Education
____ 16 Technical Education
____ 17 Trade and Industrial Education
____ 22 Cooperative Education
____ Career Education
X Other (Specify) Comprehensive Vocational Education

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____ Pre-K Thru 6
____ Post-Secondary
____ Administrator (Pre-Service)
____ 7-8
____ Adult
X 9-10
____ Teacher (Pre-service)
____ Other (Specify) ____
X 11-12

9. Intended for Use By:

X Student
____ Teacher Educator
X Classroom Teacher
X Guidance Staff
X Local Administrator
X State Personnel
____ Other (Specify) ____

0. Student Type:

X Regular
X Limited-English Proficiency
X Disadvantaged
X Handicapped
____ Other (Specify) ____

1. Medium and Format of Materials:

X HARDCOPY
No. of pages ____
X Paper bound
__ Hard bound
__ Loose-leaf
Photos: Yes ____ No X
Diagrams: Yes X No ____

__ VIDEOTAPE
____ Minutes
__ B & W
__ Color
____ inches

__ FILM
____ Minutes
__ B & W
__ Color
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__ Color

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(Specify) ___

___ FILM STRIPS

No. of frames ___
- ___ B & W
- ___ Color
- ___ Audio

___ AUDIO

- ___ Automatic synch
- ___ ___ Hz
- ___ Manual cue
- ___ Reel
- ___ Cassette
- ___ Cartridge

___ OTHER

Specify: ___

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Contact: Name Dr. James P. Greenan, OCDSP Phone (217) 333-2325

Address Department of Vocational and Technical Education
College of Education, University of Illinois Zip Code ___

13. Copyright Restrictions:

Contact. Name (In the Public Domain) Phone ( ) ___

Address ___ Zip Code ___

14 What level(s) of assistance is required to provide implementation of this outcome?

X awareness
X deciding
X understanding
X implementing

15. Are Consultive/Inservice (or staff development) available? Yes X No ___

Contact: Illinois State Board of Education
Department of Adult, Vocational and Technical Education
Research and Development Section, E-426
100 North First Street
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17 Person Completing this Abstract Dr. James P. Greenan

Full Address Office of Career Development for Special Populations
Department of Vocational and Technical Education
College of Education
345 Education Building
University of Illinois
1310 S. Sixth Street
Champaign, Illinois Zip 61820

16. General Description:

This product will provide vocational teachers and other school personnel with a resource directory of materials useful in teaching mathematics skills in vocational programs. The directory provides information that includes: (a) titles, (b) authors, (c) source, (d) description, and (e) cost. The directory may be used in combination with the Generalizable Mathematics Skills User Manual. After accessing students' mathematics skills, teachers may use the directory to locate and select appropriate instructional materials to teach mathematics skills.

K. Conference/Workshop Summary(ies)

The provisions of this contract did not specifically call for the project to develop and conduct conferences or workshops. Listed below are the conferences, workshops, and meetings attended by the project staff members. While attending these conferences the 'Generalizable Skills' project was discussed with other participants. The project abstract, general information, manuscripts, publications, and draft materials were exchanged. Staff attendance at these conferences provided excellent opportunities to obtain input, suggestions, and recommendations from researchers and practitioners regarding present and future project activities. Regular staff meetings and individual meetings with staff, project advisory committee members, ISBE personnel, and other resources have all been detailed in previous quarterly progress reports. The conferences, workshops, and meetings attended by the staff include:

May 18, 1983	Dr. Peter Seidman, Contract Administrator ISBE/DAVTE Springfield, Illinois
July 27, 1983	DAVTE Project Directors' Conference Sangamon State University Springfield, Illinois
July 1, 1983 - June 30, 1984	Met individually with project advisory committee members several times
August 15-19, 1983	IVA Conference Springfield, Illinois
September 22, 1983	'Generalizable Skills' and 'Change Skills' project staff and DAVTE personnel meeting, Springfield, Illinois
October 4-5, 1983	Illinois High Technology Conference Springfield, Illinois
October 19-22, 1983	Division on Career Development International Conference, PAC meeting, and CEC/DCD Executive Board meeting Chicago, Illinois

November 7, 1983	PAC meeting Champaign, Illinois
November 9-10, 1983	Mississippi Valley Industrial Education Conference Chicago, Illinois
December 2-6, 1983	American Vocational Association Conference Anaheim, California
February 24, 1984	'Generalizable Skills' and 'Change Skills' and DAVTE personnel meeting Springfield, Illinois
March 8-9, 1984	Meeting of the BIG 10 University Consortium on Career Development for Special Populations University of Minnesota St. Paul, Minnesota
March 15, 1984	IVA/DAVTE Workshop Triton College Chicago, Illinois
March 27-28, 1984	National Network Conference Denver, Colorado
April 3-4, 1984	Teacher Education Conference Springfield, Illinois
April 3, 1984	'Generalizable Skills' and 'Change Skills' and DAVTE personnel meeting Springfield, Illinois
April 6, 1984	IDCD-ILAVESNP Conference Chicago, Illinois
April 23-24, 1984	National Network Conference Washington, D.C.
April 23-27, 1984	Council for Exceptional Children Conference, CEC/DCD Executive Board meeting, CEC annual business meeting, NAC meeting and CEC Research Committee meeting Washington, D.C.
April 30-May 1, 1984	Rupert N. Evans Symposium Allerton, Illinois
May 21, 1984	Met with Bloomington AVC personnel Bloomington, Illinois
June 6, 1984	Conduct inservice training on teaching generalizable skills Chicago, Illinois
June 22, 1984	Meet with DAVTE personnel

L. Resource Listing:

The resources obtained through this project have been added to the library of the Department of Vocational and Technical Education. Several of the resources (publications and instructional materials) were obtained at no cost. A special section of the library related to generalizable skills has been established as a result of this project. This section of the library is used by undergraduates and graduate students in the Department of Vocational and Technical Education, and by several faculty members from the Department and College of Education. The specific instructional materials used in the undergraduate programs are placed in a special section of the library.

M. Accomplishments, Including Significant Findings:

The major accomplishments of the project include the following:

1. Identified and selected the project advisory committee.
2. Identified and selected the population and sample.
3. Coordinated the 'Generalizable Skills' project activities with the 'Change Skills' project activities.
4. Developed the set of student self-ratings, teacher ratings, and performance test mathematics assessment instruments.
5. Field tested the generalizable mathematics assessment instruments.
6. Determined the reliability and validity of the assessment instruments.
7. Developed strategies and procedures for using the generalizable mathematics skills assessment instruments.
8. Produced the Generalizable Mathematics Skills User Manual, Generalizable Mathematics Skills Resource Directory, and Final Report.

The staff has been invited to describe the project activities in several classes, professional conferences, and meetings. Technical

assistance requests were received (and fulfilled) from local, state, and national levels regarding research and practice in the area of generalizable skills. Descriptions of conference presentations, journal articles and research reports, and technical assistance/service activities have been included in each of the previous quarterly progress reports.

N. Major Activities and Events:

This section lists the major activities of the 'Generalizable Skills' project during 1983-84 that include:

Task 1: Identify and select the Project Advisory Committee

1.1 Identify additional potential (PAC) members.

1.2 Select and telephone call each prospective PAC member informing him/her of the project, activities, and requesting their participation.

1.3 Send a follow-up letter to each PAC member (See Appendix A) expressing appreciation for serving on the committee, a list of PAC member activities, and a project proposal.

Task 2: Identify and select the population and sample

2.1 Select from the 32 secondary area vocational centers (AVC) a purposive (or representative) sample of 3 AVCs in the State of Illinois: (a) Danville VOTEC, (b) Decatur Area Vocational Center, (c) Sauk Area Career Center. The final selection was based on the number of students, number of teachers, and number and variety of programs.

2.2 Telephone call each prospective AVC director participant informing him of the project, activities, requesting his

AVCs participation, and establishing tentative dates for field testing.

2.3 Send a follow-up letter (See Appendix B) to each AVC director expressing appreciation for his willingness to participate in the project, and providing a tentative schedule of activities.

2.4 Attend DAVTE Project Director Meeting.

2.5 Attend Illinois Vocational Association Conference.

Task 3: Coordinate "Generalizable Skills" project activities with "Change Skills" project staff activities

3.1 Attend first meeting with the "Change Skills" project staff and DAVTE personnel.

3.2 Write quarterly progress report #1.

3.21 Attend and present at Illinois High Technology Conference.

3.22 Attend and present at DCD Conference and Executive Board meeting.

3.23 Attend Mississippi Valley Conference.

3.24 Attend and present at the American Vocational Association Conference.

3.3 Attend second meeting with the 'Change Skills' project staff and DAVTE personnel.

3.4 Write quarterly progress report #2.

3.5 Attend third meeting with the 'Change Skills' project staff and DAVTE personnel.

3.6 Write quarterly progress report #3.

3.61 Attend and present at BIG 10 Research Consortium Meeting.

3.62 Attend and present at IVA/DAVTE workshop.

3.63 Attend and present at National Network Conference.

3.64 Attend and present at Illinois Teacher Education Conference.

3.65 Attend IDCD-ILAVESNP Conference.

3.66 Attend and present at National Network Conference.

3.67 Attend CEC, CEC/DCD Executive Board meeting, DCD annual business meeting, NAC meeting and CEC Research Committee meeting.

3.68 Attend Evans Symposium.

3.69 Meet with Bloomington Area Vocational Center personnel.

3.70 Conduct inservice training on teaching generalizable skills in Chicago.

3.71 Meet with DAVTE personnel.

Task 4: Develop a set of student self-ratings, teacher ratings, and performance test assessment instruments designed to measure the generalizable mathematics skills of students in secondary vocational programs.

4.1 Identify and select the list of generalizable mathematics skills developed by Greenan (1983) as a basis for developing the assessment instruments (See Appendix C).

4.2 Conduct a review of literature regarding instrument design and theory of student self-ratings, teacher ratings, and performance tests in the area of mathematics. The review concerned existing theory on variables related specifically to the instrument development phase of the study.

4.3 Develop a draft set of student self-ratings, teacher ratings, and performance test mathematics assessment instruments.

4.4 Send the draft instruments to the PAC members for review and critique.

4.5 Revise the assessment instruments according to PAC members' comments, additions, and/or deletions in terms of content, meaning, clarity, and readability.

4.6 Send the revised instruments to the PAC members for review and critique.

4.61 Convene PAC meeting.

4.7 Revise the assessment instruments according to the PAC members' comments, additions, and/or deletions in terms of content, meaning, clarity, and readability.

4.8 Send the revised assessment instruments to the PAC members for review and critique and pilot test the assessment instruments on a random sample of students and teachers in selected secondary area vocational centers.

4.9 Produce the final versions of the student self-ratings, teacher ratings, and performance test of generalizable mathematics skills (See Appendix D).

4.10 Print the appropriate number of assessment instruments.

Task 5: Field test the assessment instruments

5.1 Contact each participating AVC (Danville VOTEC, Decatur AVC, Sauk ACC) and confirm the field test schedules. Call each AVC to obtain lists of students/programs.

5.2 Make all necessary arrangements for field testing activities.

5.3 Field test instruments in Danville VOTEC.

5.4 Field test instruments in Decatur Area Vocational Center.

5.5 Field test instruments in Sauk Area Career Center.

5.6 Send a follow-up letter to each AVC expressing appreciation for participating in the field testing (See Appendix E).

Task 6: Determine the reliability and validity of the mathematics skills assessment instruments

6.1 Develop and write SPSS computer programs (internal consistency reliability, test-retest reliability, item analysis, and correlations) for analyzing the data provided by the student self-ratings, teacher ratings, and performance test according to the control variables (type of vocational program, gender, and level of mathematics aptitude) (See Appendix F).

6.2 Process instruments by entering and verifying data on tape.

6.3 Run computer programs and revise as necessary.

6.4 Compile all computer output on the assessment instruments (See Appendix G).

6.5 Analyze data and construct data tables (See Appendix H).

Task 7: Formulate strategies and procedures for using the generalizable mathematics skills assessment instruments

7.1 Conduct a survey and follow-up (See Appendix I) to determine the AVCs present capabilities and procedures for identifying, assessing, and/or teaching mathematics skills.

7.2 Conduct a review of literature regarding strategies and procedures for identifying, assessing, and/or teaching mathematics skills.

7.3 Collect data through interviews and observations during the field testing to determine alternative procedures for identifying, assessing, and/or teaching mathematics skills.

7.4 Synthesize all data and information and develop strategies and procedures for identifying, assessing, and/or teaching mathematics skills.

Task 8: Produce the product and final report

8.1 Develop the draft product (Mathematics Skills User Manual) and final report.

8.2 Send the draft User Manual and final report to the PAC members and DAVTE personnel for their review, critique, and pilot testing.

8.3 Produce and disseminate the User Manual and final report according to the PAC members' and DAVTE personnel comments, additions, and/or deletions; and pilot test information.

O. Problems:

There were no major problems relative to the progress made on the 'Generalizable Skills' project this year.

P. Publicity:

The 'Generalizable Skills' project received direct publicity primarily through class presentations, presentations at professional conferences and meetings, publications, and technical assistance to LEAs, SEAs, and national level agencies and persons. Dr. Greenan's involvement in professional associations in leadership capacities has further publicized the project activities. His past and current publication record also reflects the present program of research in generalizable skills. In summary, Dr. Greenan's several instructional, research, and service activities have all contributed to receiving publicity for the generalizable skills project and its products.

Q. Resource Persons:

The principal resource persons for the 'Generalizable Skills' project were the Project Advisory Committee (PAC) members. The PAC members included:

Dr. James Dunn, Director
Institute for Occupational
Education
College of Education
Cornell University
Ithaca, New York

Dr. Maurice Tatsuoka
Department of Educational
Psychology
College of Education
University of Illinois
Champaign, Illinois

Dr. Frank Pratzner
The National Center for Research
in Vocational Education
Ohio State University
Columbus, Ohio

Kay Smoot, Resource Teacher
VOTEC
Danville, Illinois

Mr. William Rosser, Counselor
Decatur Area Vocational Center
Decatur, Illinois

Dr. John C. Ory
Department of Educational
Psychology
College of Education
University of Illinois
Champaign, Illinois

Dr. Brandon B. Smith, Director
Minnesota Research and
Development Center for
Vocational Education
University of Minnesota
St. Paul, Minnesota

Dr. James J. Hirstein
Secondary and Continuing
Education
College of Education
University of Illinois
Champaign, Illinois

James Facko, Mathematics Teacher
Sauk Area Career Center
Robbins, Illinois

Dr. James D. Raths
CIRCE/TE
College of Education
University of Illinois
Champaign, Illinois

Several faculty, staff, and graduate students from various departments (Educational Psychology) and units (Office of Career Development for Special Populations) in the College of Education at the University of Illinois also provided helpful suggestions and recommendations regarding project activities. The area vocational center directors and several teachers and students also provided input especially in the review of procedures, instruments, materials, and

products. Numerous teacher educators, researchers, state education agency personnel, and local education agency personnel from other states provided feedback and suggestions regarding project activities at professional conferences and meetings.

The contributions of these individuals varied according to their individual expertise and needs of specific project activities. For example, some persons provided suggestions and recommendations with respect to instrumentation and research design, while other persons reviewed and critiqued materials and products. The collective input from all individuals was extremely valuable to the success of the project.

R. Summations of Evaluation Data Collected:

The principal evaluation data collected through this project were formative evaluation data for each of the major tasks. Formative evaluation included: (a) immediate participant (i.e., area vocational center directors, consultants, teachers, and PAC members' evaluation and feedback), (b) PAC review, and (c) adherence to timelines. The results of these formative evaluations were communicated in the quarterly progress reports for each task to DAVTE personnel and PAC members. Listed below are the results of the evaluation data collected:

Task 1: Based on the outline in the procedures section and input from project staff and DAVTE personnel, the project advisory committee will be identified and selected.

Task 2: Based on the outline in the procedures section and input from project staff, PAC members, and DAVTE personnel, the population and sample for the study will be identified and selected.

Task 3: The 'Generalizable Skills' project and the 'Change Skills' project activities will be considered coordinated based on the outcomes of the quarterly meetings.

Task 4: The student self-ratings, teacher ratings, and performance test of generalizable mathematics skills will be developed and considered adequate according to project staff fulfillment of sub-tasks, consultant review, and input from the PAC members, AVC directors, teachers, students, and DAVTE personnel.

Task 5: The mathematics skills assessment instruments will be adequately field tested according to the outline provided in the procedures section, and input from PAC members, AVC directors, teachers, students, and DAVTE personnel.

Task 6: Based on the procedural outline, review and critique by PAC members, DAVTE personnel, and consultants, the student self-ratings, teacher ratings, and performance test will be considered sufficient and adequate in terms of reliability and validity.

Task 7: Strategies and Procedures for using the generalizable mathematics skills assessment instruments will be formulated and considered adequate according to project staff adherence to the completion of sub-tasks, and review and critique by the PAC members, DAVTE personnel, and school personnel.

Task 8: The PAC members, DAVTE personnel, consultants, and school personnel will review and critique the comprehensiveness and quality of the product (Mathematics Skills User Manual) and final report.

S. Statement of Impact:

The dissemination plan included the delivery of 50 copies of the Generalizable Mathematics Skills User Manual and Generalizable Mathematics Skills Resource Directory and 20 copies of the final report to the ISBE/DAVTE. In addition, copies of each report were sent to the PAC members. The remaining copies will be disseminated upon individual requests while the supply lasts to at least the following target groups: LEA and SEA personnel, state and local advisory councils, teacher educators, researchers, and national research and development centers. The reports will also be submitted to the ERIC Clearinghouse.

The results and products of this project are expected to have short-range and long-range impact. However, the impact of the

dissemination is difficult to determine presently because dissemination is just beginning to occur at the end of the project period. Dissemination impact will be more easily assessed after the project reports, products, and information have been widely circulated.

T. Conclusions and Recommendations:

The conclusions of this study are based on the data presented for each of the two objectives and include:

1. The generalizable mathematics student self-ratings, teacher ratings, and performance test assessment instruments possess content and face validity relative to the mathematics skills required in vocational programs and occupations.
2. The assessment instruments are highly reliable in terms of internal consistency reliability and test-retest reliability for students in different vocational programs, males and females, and students who have high, medium, and low mathematics aptitude.
3. The student self-ratings and teacher ratings relate or agree moderately with students' scores as measured by the performance test.
4. The items contained in the performance test assessment instrument are moderately easy or difficult and discriminate well between those students who score high and those students who score low.
5. The generalizable mathematics skills assessment User Manual and Resource Directory are considered to possess an adequate degree of reliability and validity and are potentially useful in secondary vocational programs.

6. The 'Generalizable Skills' project and 'Change Skills' project activities were coordinated as evidenced by quarterly meetings, joint conference/workshop presentations, and other activities.

Based on the research methods, findings, and conclusions of this study, several recommendations can be made for practice and future research. The recommendations include:

1. Future field testing of the generalizable mathematics skills assessment instruments (student self-ratings, teacher ratings, performance test) should include other populations at the secondary, post-secondary, and/or adult levels. The more general vocational programs including industrial arts, consumer homemaking, and general business could be investigated. The rationale, instruments, and procedures used in this study should be equally applicable to other populations/samples. Future studies should use populations where special populations (handicapped, disadvantaged, and limited-English proficient) as well as non-special populations are known to exist.
2. Students and school personnel including teachers, counselors, administrators, paraprofessionals should begin to use the generalizable mathematics skills student self-ratings, teacher ratings, and performance test assessment instruments for assessment, planning, curriculum development, instructional methods and delivery, and evaluation.
3. School personnel need to begin teaching and/or coordinate their teaching of generalizable mathematics skills as they relate to individual vocational programs.
4. School personnel need to work more closely with "academic" teachers (e.g. mathematics, English, reading), remedial teachers

and support service providers, and special needs teachers to effectively provide the necessary instruction and related services to students known to lack generalizable mathematics skills.

5. Pertaining to generalizable mathematics skills, vocational educators need to evaluate their instructional/support service delivery systems regarding the services provided, persons involved in delivering services, when services are provided, how services are provided, where services are provided, and the procedures used to evaluate the adequacy, quality, and effect of services provided to students.
6. Program evaluations need to formulate and convey the necessary instructional procedures personnel will use to increase students' generalizable mathematics skills.

U. Staff Development:

The staff development activities for the project staff consisted primarily of participation in several professional conferences, workshops, and meetings. These are listed in the "Conference/Workshop Summary(ies)" section. Interaction with the Project Advisory Committee members and other resource persons provided additional staff development.

V. Other Activities:

Several additional activities were undertaken by the project staff beyond those described in the proposal. For example, the staff delivered several presentations at national, state, regional, and local conferences. The presentations are listed in the "Conference/Workshop Summary(ies)" section. The Generalizable Mathematics Skills Resource Directory is an additional product produced by the staff.

Various dissemination and technical assistance activities were also carried out by the project staff.

W. Materials Developed:

The following major materials and products were developed by the 'Generalizable Skills' project staff during 1983-84:

1. Quarterly Progress Reports (October 1, 1983; January 1, 1984; April 1, 1984).
2. Generalizable Mathematics Skills User Manual, June, 1984.
3. Generalizable Mathematics Skills Resource Directory, June, 1984.

Appendices

Appendix A

Project Advisory Committee Letter

University of Illinois at Urbana-Champaign

College of Education
Department of Vocational
and Technical Education
OFFICE OF VOCATIONAL EDUCATION RESEARCH

32 Education Building
1310 South Sixth Street
Champaign, Illinois 61820
(217) 333-0185

July 14, 1983

Dr. Frank Pratzner
The National Center for Research
in Vocational Education
Ohio State University
1960 Kenny Road
Columbus, OH 43210

Dear Dr. Pratzner:

I would like to thank you for your willingness to serve on the advisory committee for the project entitled: "The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills." The project is being funded by the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education. Your interest, expertise and involvement will provide an invaluable contribution to the project.

The major focus of the project advisory committee (PAC) activities will be to provide input and feedback on concepts generated, instruments produced, data analysis, products developed, and other activities for the duration of the project. In addition, if possible, the entire PAC will meet at least once during the next twelve months.

Enclosed you will find a copy of the project proposal and abstract for your review. The proposal contains all phases of project operation. In particular, you will want to focus on the objectives, procedures, and evaluation sections since they specify the major project activities. Upon reading the procedures section you will have an idea of the scope of activities involving the PAC during the project.

Again, I would like to thank you for your participation on the PAC and look forward to working with you. If you have any questions, don't hesitate to contact me.

Sincerely,

Jim Greenan

James P. Greenan

JPG/cja/G
Enclosure: Project proposal and abstract

Appendix B

Area Vocational Center Director Follow-up Letter

University of Illinois at Urbana-Champaign

College of Education
Department of Vocational
and Technical Education
OFFICE OF VOCATIONAL EDUCATION RESEARCH

32 Education Building
1310 South Sixth Street
Champaign, Illinois 61820
(217) 333-0185

July 14, 1983

Mr. T. James Oettel, Director
Decatur Area Vocational Center
300 East Eldorado Street
Decatur, Illinois 62523

Dear Mr. Oettel:

I enjoyed talking with you on the telephone today, and thank you for the information you provided to me regarding your AVC's types of programs, numbers of teachers, and projected student enrollments for the 1983-84 school year. The information will be helpful in planning future project activities for the Illinois State Board of Education/Department of Adult, Vocational, and Technical Educaton (DAVTE) funded project entitled, "The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills." Last year mathematics skills were identified which are basic to, necessary for success in, and transferable within and among secondary vocational training programs. The expectation of the project is that practical instruments and procedures will be developed that are capable of assessing students' mathematics skills, and suggesting areas in which students need instruction and/or support services.

The "Generalizable Skills" project staff and DAVTE personnel wish to thank you for your AVC's interest and willingness to participate in the project. As I discussed during our conversation, the project staff would like to possibly include several of your teachers and students in the field testing of a set of instruments and procedures designed to measure the generalizable mathematics skills of students in secondary vocational training programs. I anticipate the field testing will occur over 1-2 days during this Fall or early Winter. Your leadership and your teachers' and students' participation will greatly help us in the task of developing and validating the instruments and procedures intended to eventually assist students to succeed in their vocational programs.

I will contact you in the next several weeks to discuss specific scheduling, plans and activities regarding the field testing. Thank you in advance for your cooperation and assistance and I look forward to working with you. If you have any questions, please don't hesitate to contact me.

Sincerely,

James P. Greenan
Principal Investigator

JPG:skt:4j

Appendix C

Generalizable Mathematics Skills

as and Programs

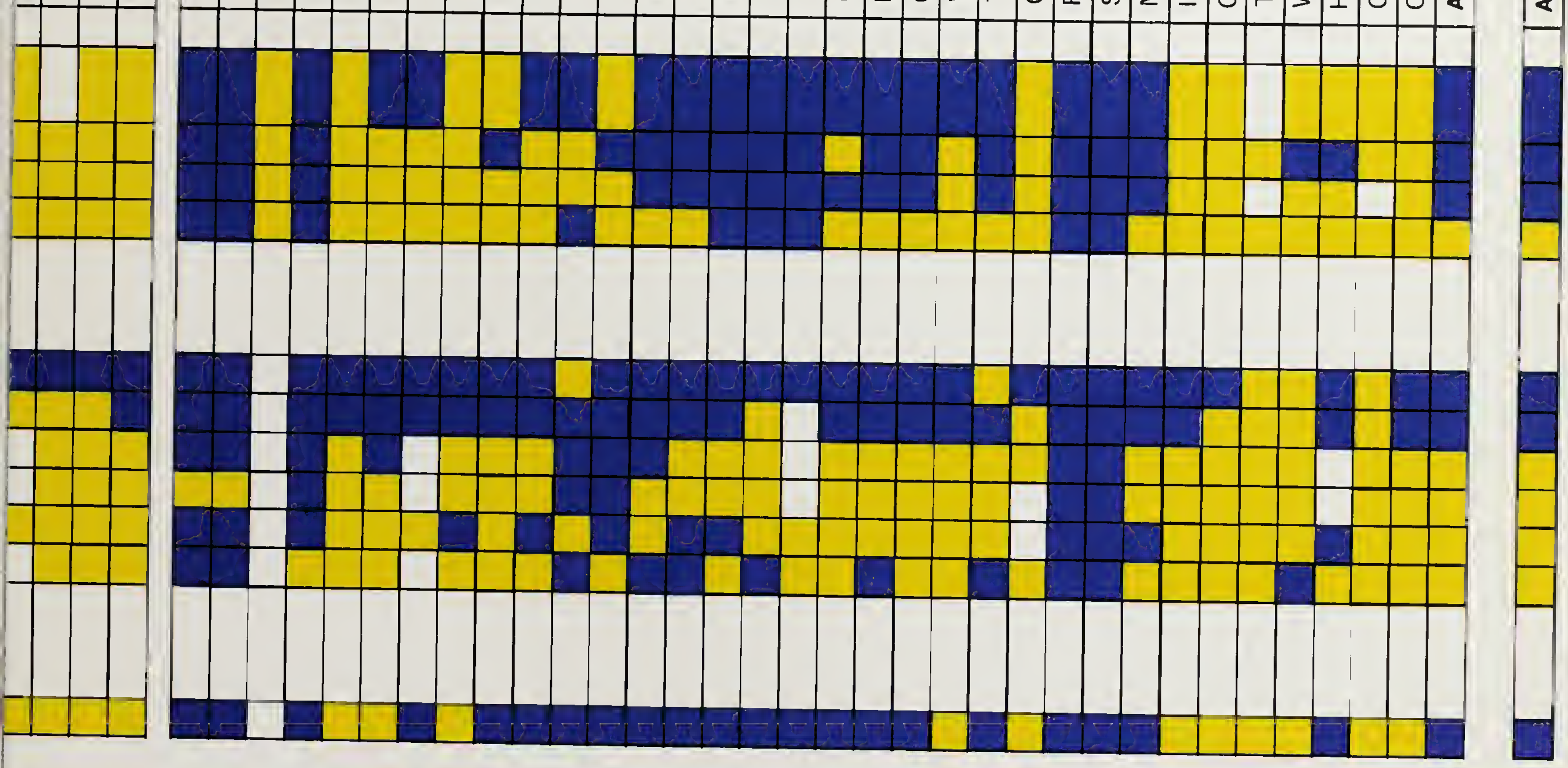
mics Occs.

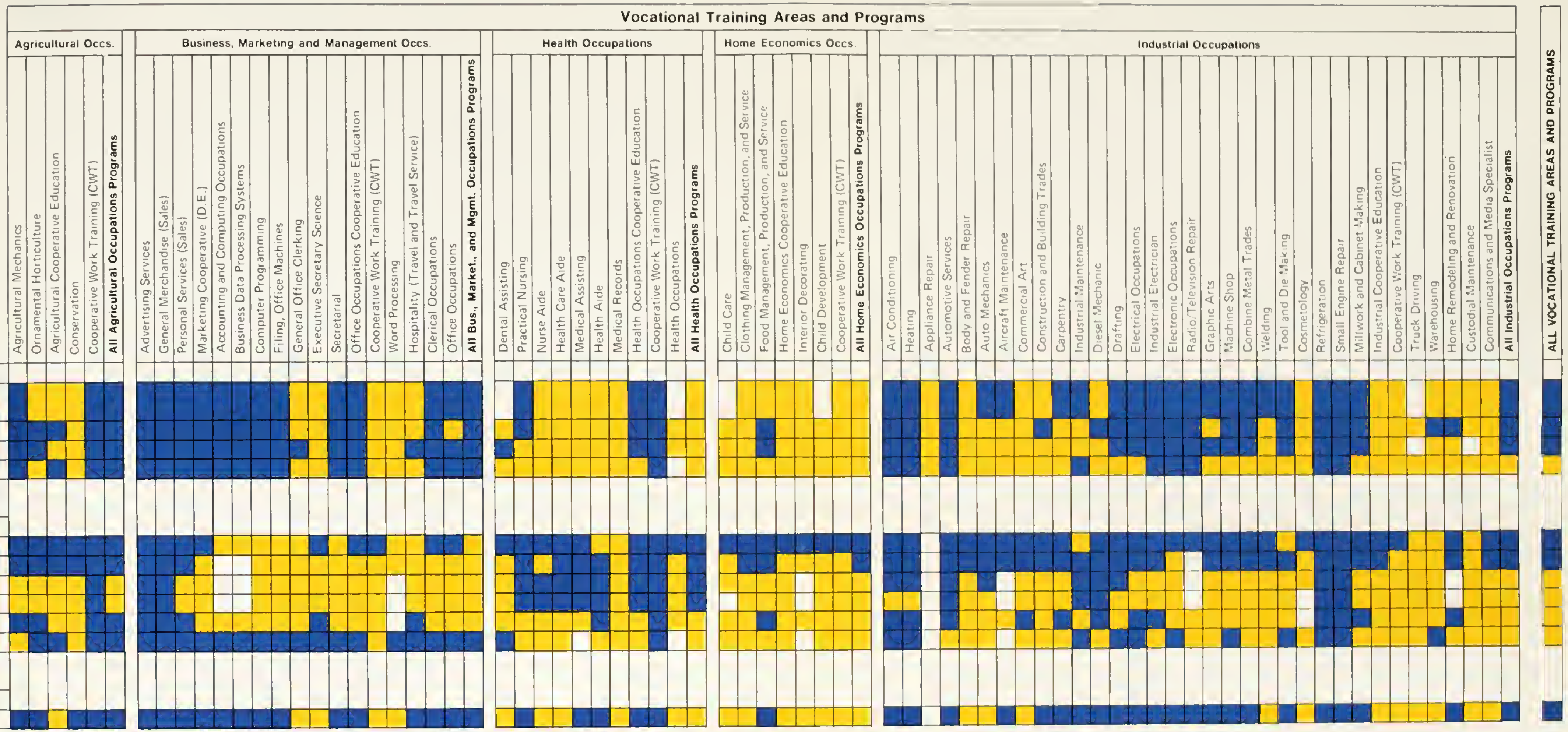
- Interior Decorating
- Child Development
- Cooperative Work Training (CWT)
- **All Home Economics Occupations Programs**

Industrial Occupations

- Air Conditioning
- Heating
- Appliance Repair
- Automotive Services
- Body and Fender Repair
- Auto Mechanics
- Aircraft Maintenance
- Commercial Art
- Construction and Building Trades
- Carpentry
- Industrial Maintenance
- Diesel Mechanic
- Drafting
- Electrical Occupations
- Industrial Electrician
- Electronic Occupations
- Radio/Television Repair
- Graphic Arts
- Machine Shop
- Combine Metal Trades
- Welding
- Tool and Die Making
- Cosmetology
- Refrigeration
- Small Engine Repair
- Millwork and Cabinet Making
- Industrial Cooperative Education
- Cooperative Work Training (CWT)
- Truck Driving
- Warehousing
- Home Remodeling and Renovation
- Custodial Maintenance
- Communications and Media Specialist
- **All Industrial Occupations Programs**

ALL VOCATIONAL TRAINING AREAS AND PROGRAMS





Vocational Training Areas and Programs

KEY

- 🟦 - High Generalizability ($\bar{x}$ = 5.01 - 7.00)
- 🟨 - Medium Generalizability ($\bar{x}$ = 3.00 - 5.00)
- ⬜ - Low Generalizability ($\bar{x}$ = 1.00 - 2.99)

	Agricultural Occs.					
	Agricultural Mechanics	Ornamental Horticulture	Agricultural Cooperative Education	Conservation	Cooperative Work Training (CWT)	**All Agricultural Occupations Programs**
Mixed Operations						
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	🟦	🟨	🟨	🟨	🟦	🟦
19. Solve word problems by selecting and using correct order of operations	🟦	🟦	🟦	🟨	🟦	🟦
20. Perform written calculations quickly	🟦	🟦	🟨	🟨	🟦	🟦
21. Compute averages	🟦	🟨	🟦	🟨	🟦	🟦
Measurement and Calculation						
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	🟦	🟦	🟦	🟦
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟦	🟦	🟦	🟦	🟦	🟦
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟨	🟨	🟨	🟨	🟦	🟨
25. Perform basic metric conversions involving weight, distance, and volume	🟨	🟨	🟨	🟨	🟦	🟨
26. Solve problems involving time, weight, distance, and volume	🟦	🟦	🟨	🟨	🟦	🟦
27. Use a calculator to perform basic arithmetic operations to solve problems	🟨	🟦	🟦	🟨	🟦	🟦
Estimation						
28. Determine if a solution to a mathematical problem is reasonable	🟦	🟦	🟨	🟦	🟦	🟦

	Business, Marketing and Management Occs.																	
	Advertising Services	General Merchandise (Sales)	Personal Services (Sales)	Marketing Cooperative (D.E.)	Accounting and Computing Occupations	Business Data Processing Systems	Computer Programming	Filing, Office Machines	General Office Clerking	Executive Secretary Science	Secretarial	Office Occupations Cooperative Education	Cooperative Work Training (CWT)	Word Processing	Hospitality (Travel and Travel Service)	Clerical Occupations	Office Occupations	**All Bus., Market., and Mgmt. Occupations Programs**
Mixed Operations																		
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟦
19. Solve word problems by selecting and using correct order of operations	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟦	🟨	🟦
20. Perform written calculations quickly	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟦
21. Compute averages	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟦
Measurement and Calculation																		
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟨
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟦	🟦	🟦	🟨	⬜	⬜	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟦	🟦	🟨	🟨	⬜	⬜	🟨	🟨	🟨	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟨
25. Perform basic metric conversions involving weight, distance, and volume	🟦	🟦	🟨	🟨	⬜	⬜	🟨	🟨	🟨	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟨
26. Solve problems involving time, weight, distance, and volume	🟦	🟦	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟨	⬜	🟦	🟨	🟨	🟨
27. Use a calculator to perform basic arithmetic operations to solve problems	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦
Estimation																		
28. Determine if a solution to a mathematical problem is reasonable	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟦

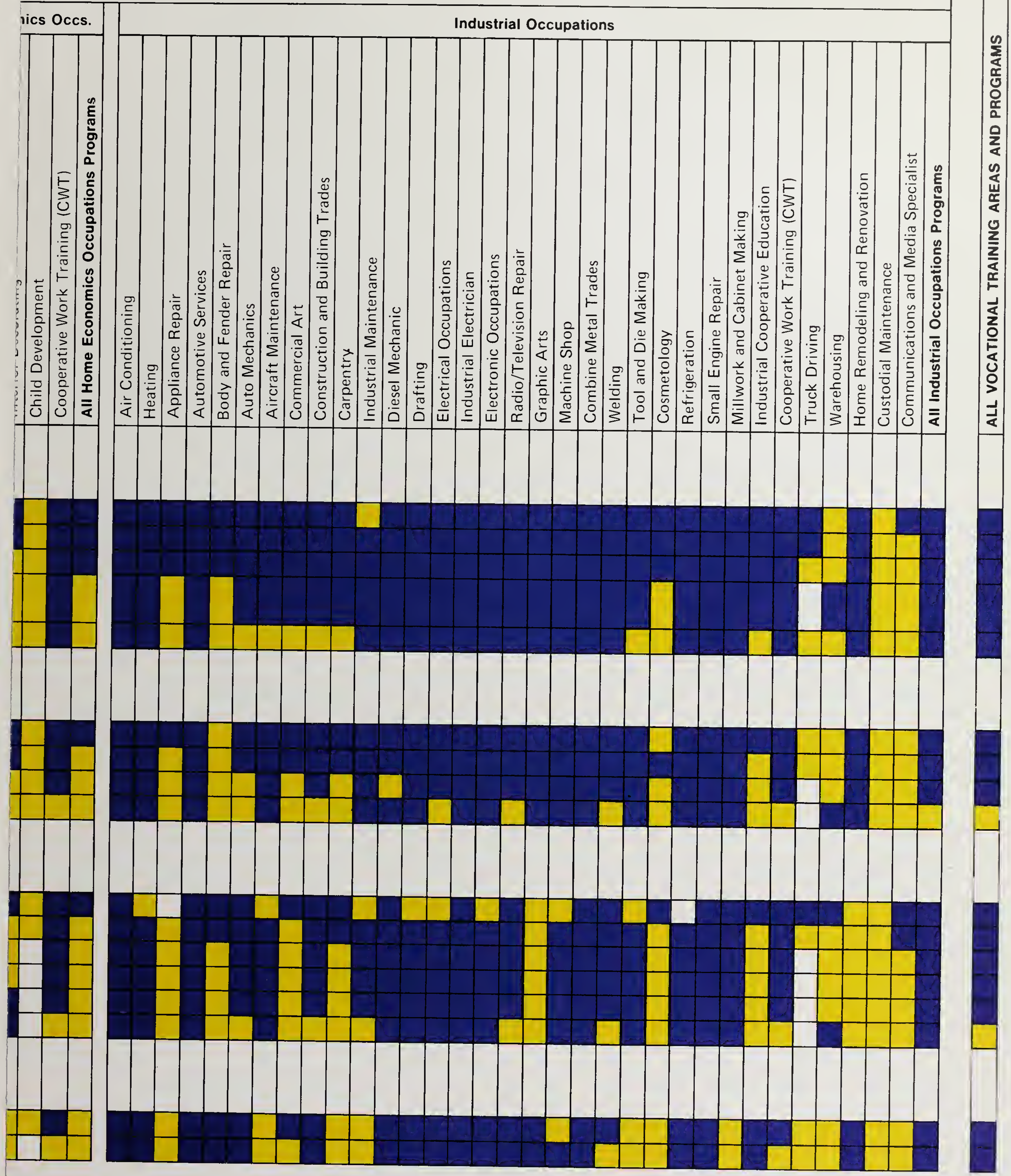
	Health Occupations										
	Dental Assisting	Practical Nursing	Nurse Aide	Health Care Aide	Medical Assisting	Health Aide	Medical Records	Health Occupations Cooperative Education	Cooperative Work Training (CWT)	Health Occupations	**All Health Occupations Programs**
Mixed Operations											
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	⬜	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	⬜	🟨
19. Solve word problems by selecting and using correct order of operations	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨
20. Perform written calculations quickly	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨
21. Compute averages	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟦	⬜	🟨
Measurement and Calculation											
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟦
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟨	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦
25. Perform basic metric conversions involving weight, distance, and volume	🟨	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦
26. Solve problems involving time, weight, distance, and volume	🟨	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟦	🟨	🟨
27. Use a calculator to perform basic arithmetic operations to solve problems	🟦	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟦	⬜	🟨
Estimation											
28. Determine if a solution to a mathematical problem is reasonable	🟨	🟦	🟨	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟨

	Home Economics Occs.							
	Child Care	Clothing Management, Production, and Service	Food Management, Production, and Service	Home Economics Cooperative Education	Interior Decorating	Child Development	Cooperative Work Training (CWT)	**All Home Economics Occupations Programs**
Mixed Operations								
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	⬜	🟨	🟨	🟨	🟨	⬜	🟨	🟨
19. Solve word problems by selecting and using correct order of operations	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨
20. Perform written calculations quickly	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨
21. Compute averages	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
Measurement and Calculation								
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟨	🟦	🟦	🟨	🟨	🟨	🟨	🟦
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨
25. Perform basic metric conversions involving weight, distance, and volume	⬜	🟨	🟨	🟨	⬜	🟨	🟨	🟨
26. Solve problems involving time, weight, distance, and volume	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨
27. Use a calculator to perform basic arithmetic operations to solve problems	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨
Estimation								
28. Determine if a solution to a mathematical problem is reasonable	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨

	Industrial Occupations																
	Air Conditioning	Heating	Appliance Repair	Automotive Services	Body and Fender Repair	Auto Mechanics	Aircraft Maintenance	Commercial Art	Construction and Building Trades	Carpentry	Industrial Maintenance	Diesel Mechanic	Drafting	Electrical Occupations	Industrial Electrician	Electronic Occupations	Radio/Television Repair
Mixed Operations																	
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦
19. Solve word problems by selecting and using correct order of operations	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟦	🟦	🟦	🟦	🟦	🟦
20. Perform written calculations quickly	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟦	🟦	🟦
21. Compute averages	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟦	🟦
Measurement and Calculation																	
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	⬜	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟦	🟦	⬜	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	⬜
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟦	🟦	⬜	🟦	🟨	🟦	⬜	🟨	🟨	🟨	🟦	🟦	🟦	🟨	🟨	🟨	⬜
25. Perform basic metric conversions involving weight, distance, and volume	🟨	🟨	⬜	🟦	🟨	🟨	⬜	🟨	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟨	⬜
26. Solve problems involving time, weight, distance, and volume	🟦	🟦	⬜	🟦	🟨	🟨	🟨	🟦	🟨	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟨
27. Use a calculator to perform basic arithmetic operations to solve problems	🟦	🟦	⬜	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟦	🟨	🟦	🟦	🟨	🟦	🟨
Estimation																	
28. Determine if a solution to a mathematical problem is reasonable	🟦	🟦	⬜	🟦	🟨	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦

	Industrial Occupations																	
	Graphic Arts	Machine Shop	Combine Metal Trades	Welding	Tool and Die Making	Cosmetology	Refrigeration	Small Engine Repair	Millwork and Cabinet Making	Industrial Cooperative Education	Cooperative Work Training (CWT)	Truck Driving	Warehousing	Home Remodeling and Renovation	Custodial Maintenance	Communications and Media Specialist	**All Industrial Occupations Programs**	**ALL VOCATIONAL TRAINING AREAS AND PROGRAMS**
Mixed Operations																		
18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟨	⬜	🟨	🟨	🟨	🟨	🟦	🟦
19. Solve word problems by selecting and using correct order of operations	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟨	🟨	🟦	🟦
20. Perform written calculations quickly	🟦	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟨	⬜	🟨	🟨	⬜	🟨	🟦	🟦
21. Compute averages	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
Measurement and Calculation																		
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟨	🟦	🟦	🟦
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟦	🟨	🟦	🟦	🟦
24. Use a measuring device to determine an object's weight, distance, or volume in metric units	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟨
25. Perform basic metric conversions involving weight, distance, and volume	🟨	🟨	🟨	🟨	🟨	⬜	🟦	🟦	🟨	🟨	🟨	🟨	🟨	⬜	🟨	🟨	🟨	🟨
26. Solve problems involving time, weight, distance, and volume	🟨	🟨	🟨	🟨	🟨	⬜	🟦	🟦	🟦	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟨	🟨
27. Use a calculator to perform basic arithmetic operations to solve problems	🟨	🟦	🟨	🟨	🟦	🟨	🟦	🟦	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨
Estimation																		
28. Determine if a solution to a mathematical problem is reasonable	🟦	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟨	🟨	🟨	🟦	🟨	🟨	🟦	🟦

s and Programs


ics Occs.
Child Development
Cooperative Work Training (CWT)
All Home Economics Occupations Programs
Industrial Occupations
Air Conditioning
Heating
Appliance Repair
Automotive Services
Body and Fender Repair
Auto Mechanics
Aircraft Maintenance
Commercial Art
Construction and Building Trades
Carpentry
Industrial Maintenance
Diesel Mechanic
Drafting
Electrical Occupations
Industrial Electrician
Electronic Occupations
Radio/Television Repair
Graphic Arts
Machine Shop
Combine Metal Trades
Welding
Tool and Die Making
Cosmetology
Refrigeration
Small Engine Repair
Millwork and Cabinet Making
Industrial Cooperative Education
Cooperative Work Training (CWT)
Truck Driving
Warehousing
Home Remodeling and Renovation
Custodial Maintenance
Communications and Media Specialist
All Industrial Occupations Programs
ALL VOCATIONAL TRAINING AREAS AND PROGRAMS

KEY

🟦 - High Generalizability ($\bar{x}$ = 5.01 - 7.00)
🟨 - Medium Generalizability ($\bar{x}$ = 3.00 - 5.00)
⬜ - Low Generalizability ($\bar{x}$ = 1.00 - 2.99)

Vocational Training Areas and Programs

Mathematics Skills	Agricultural Occs.					
	Agricultural Mechanics	Ornamental Horticulture	Agricultural Cooperative Education	Conservation	Cooperative Work Training (CWT)	**All Agricultural Occupations Programs**
Whole Numbers						
1. Read, write, and count single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦
2. Add and subtract single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦
3. Multiply and divide single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦
5. Round off single and multiple digit whole numbers	🟦	🟦	🟦	🟨	🟦	🟦
Fractions						
6. Read and write common fractions	🟦	🟦	🟦	🟦	🟦	🟦
7. Add and subtract common fractions	🟦	🟦	🟨	🟨	🟦	🟦
8. Multiply and divide common fractions	🟦	🟨	🟨	🟨	🟦	🟨
9. Solve word problems with common fractions	🟨	🟦	🟨	🟨	🟦	🟨
Decimals						
10. Carry out arithmetic computations involving dollars and cents	🟦	🟦	🟦	🟦	🟦	🟦
11. Read and write decimals in one and more places	🟦	🟦	🟨	🟨	🟦	🟦
12. Round off decimals to one or more places	🟦	🟦	🟨	🟨	🟦	🟦
13. Multiply and divide decimals in one or more places	🟦	🟦	🟨	🟨	🟦	🟦
14. Add and subtract decimals in one or more places	🟦	🟦	🟦	🟨	🟦	🟦
15. Solve word problems with decimals in one or more places	🟦	🟦	🟨	🟨	🟦	🟦
Percent						
16. Read and write percents	🟦	🟦	🟦	🟦	🟦	🟦
17. Compute percents	🟦	🟦	🟦	🟦	🟦	🟦

Mathematics Skills	Business, Marketing and Management Occs.																	
	Advertising Services	General Merchandise (Sales)	Personal Services (Sales)	Marketing Cooperative (D.E.)	Accounting and Computing Occupations	Business Data Processing Systems	Computer Programming	Filing, Office Machines	General Office Clerking	Executive Secretary Science	Secretarial	Office Occupations Cooperative Education	Cooperative Work Training (CWT)	Word Processing	Hospitality (Travel and Travel Service)	Clerical Occupations	Office Occupations	**All Bus., Market., and Mgmt. Occupations Programs**
Whole Numbers																		
1. Read, write, and count single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
2. Add and subtract single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
3. Multiply and divide single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦
5. Round off single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
Fractions																		
6. Read and write common fractions	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦
7. Add and subtract common fractions	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦
8. Multiply and divide common fractions	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟦
9. Solve word problems with common fractions	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟦
Decimals																		
10. Carry out arithmetic computations involving dollars and cents	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
11. Read and write decimals in one and more places	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
12. Round off decimals to one or more places	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
13. Multiply and divide decimals in one or more places	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
14. Add and subtract decimals in one or more places	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦
15. Solve word problems with decimals in one or more places	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟨	🟦
Percent																		
16. Read and write percents	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦
17. Compute percents	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟦

Mathematics Skills	Health Occupations										
	Dental Assisting	Practical Nursing	Nurse Aide	Health Care Aide	Medical Assisting	Health Aide	Medical Records	Health Occupations Cooperative Education	Cooperative Work Training (CWT)	Health Occupations	**All Health Occupations Programs**
Whole Numbers											
1. Read, write, and count single and multiple digit whole numbers	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟦
2. Add and subtract single and multiple digit whole numbers	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟦
3. Multiply and divide single and multiple digit whole numbers	🟨	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟦	🟨	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟨	🟦	🟨	🟨	🟦	🟨	🟨	🟦	🟦	🟨	🟨
5. Round off single and multiple digit whole numbers	🟨	🟦	🟨	🟨	🟨	🟦	🟨	🟨	🟦	🟨	🟨
Fractions											
6. Read and write common fractions	🟨	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦
7. Add and subtract common fractions	⬜	🟦	🟨	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟨
8. Multiply and divide common fractions	⬜	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟨
9. Solve word problems with common fractions	⬜	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨
Decimals											
10. Carry out arithmetic computations involving dollars and cents	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	⬜	🟨
11. Read and write decimals in one and more places	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨
12. Round off decimals to one or more places	🟨	🟦	🟨	🟦	🟨	🟨	🟨	🟦	🟦	⬜	🟨
13. Multiply and divide decimals in one or more places	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	⬜	🟨
14. Add and subtract decimals in one or more places	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	⬜	🟨
15. Solve word problems with decimals in one or more places	⬜	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	⬜	🟨
Percent											
16. Read and write percents	🟨	🟦	🟨	🟦	🟨	🟨	🟨	🟦	🟦	🟨	🟨
17. Compute percents	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟨	🟨

Mathematics Skills	Home Economics Occs.							
	Child Care	Clothing Management, Production, and Service	Food Management, Production, and Service	Home Economics Cooperative Education	Interior Decorating	Child Development	Cooperative Work Training (CWT)	**All Home Economics Occupations Programs**
Whole Numbers								
1. Read, write, and count single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦
2. Add and subtract single and multiple digit whole numbers	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦
3. Multiply and divide single and multiple digit whole numbers	🟨	🟦	🟦	🟦	🟨	🟨	🟦	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟨
5. Round off single and multiple digit whole numbers	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟨
Fractions								
6. Read and write common fractions	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦
7. Add and subtract common fractions	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟨
8. Multiply and divide common fractions	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟨
9. Solve word problems with common fractions	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟨
Decimals								
10. Carry out arithmetic computations involving dollars and cents	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦
11. Read and write decimals in one and more places	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟨
12. Round off decimals to one or more places	🟨	🟨	🟦	🟨	🟨	⬜	🟦	🟨
13. Multiply and divide decimals in one or more places	🟨	🟨	🟦	🟨	🟨	⬜	🟦	🟨
14. Add and subtract decimals in one or more places	⬜	🟦	🟦	🟨	🟦	⬜	🟦	🟨
15. Solve word problems with decimals in one or more places	⬜	🟨	🟦	🟨	🟦	⬜	🟨	🟨
Percent								
16. Read and write percents	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟨
17. Compute percents	🟨	🟨	🟦	🟨	🟨	⬜	🟨	🟨

Mathematics Skills	Industrial Occupations																																	
	Air Conditioning	Heating	Appliance Repair	Automotive Services	Body and Fender Repair	Auto Mechanics	Aircraft Maintenance	Commercial Art	Construction and Building Trades	Carpentry	Industrial Maintenance	Diesel Mechanic	Drafting	Electrical Occupations	Industrial Electrician	Electronic Occupations	Radio Television Repair	Graphic Arts	Machine Shop	Combine Metal Trades	Welding	Tool and Die Making	Cosmetology	Refrigeration	Small Engine Repair	Millwork and Cabinet Making	Industrial Cooperative Education	Cooperative Work Training (CWT)	Truck Driving	Warehousing	Home Remodeling and Renovation	Custodial Maintenance	Communications and Media Specialist	**All Industrial Occupations Programs**
Whole Numbers																																		
1. Read, write, and count single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟨	🟦	🟦
2. Add and subtract single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟦
3. Multiply and divide single and multiple digit whole numbers	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟨	🟨	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	⬜	🟦	🟦	🟨	🟨	🟦
5. Round off single and multiple digit whole numbers	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟨	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟨	🟦
Fractions																																		
6. Read and write common fractions	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟨	🟨	🟦
7. Add and subtract common fractions	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟨	🟦
8. Multiply and divide common fractions	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	⬜	🟨	🟦	🟨	🟨	🟦
9. Solve word problems with common fractions	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟨	🟨	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟨	⬜	🟦	🟦	🟨	🟨	🟨
Decimals																																		
10. Carry out arithmetic computations involving dollars and cents	🟦	🟨	⬜	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟦	🟨	🟨	🟦	🟦	🟨	🟦	⬜	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦
11. Read and write decimals in one and more places	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟨	🟦	🟦
12. Round off decimals to one or more places	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	⬜	🟨	🟨	🟨	🟨	🟦
13. Multiply and divide decimals in one or more places	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	⬜	🟨	🟨	🟨	🟨	🟦
14. Add and subtract decimals in one or more places	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	⬜	🟨	🟨	🟨	🟨	🟦
15. Solve word problems with decimals in one or more places	🟦	🟦	🟨	🟦	🟨	🟨	🟦	🟨	🟨	🟨	🟨	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟦	🟨	🟦	🟦	🟦	🟨	🟨	⬜	🟦	🟨	🟨	🟨	🟦
Percent																																		
16. Read and write percents	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟦	🟨	🟦	🟦	🟨	🟨	🟦	🟨	🟨	🟦
17. Compute percents	🟦	🟦	🟨	🟦	🟦	🟦	🟨	🟨	🟦	🟨	🟨	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟨	🟨	🟨	🟦	🟦	🟨	🟦	🟨	🟨	🟨	🟦	🟨	🟨	🟦

Mathematics Skills	ALL VOCATIONAL TRAINING AREAS AND PROGRAMS
Whole Numbers	
1. Read, write, and count single and multiple digit whole numbers	🟦
2. Add and subtract single and multiple digit whole numbers	🟦
3. Multiply and divide single and multiple digit whole numbers	🟦
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers	🟦
5. Round off single and multiple digit whole numbers	🟦
Fractions	
6. Read and write common fractions	🟦
7. Add and subtract common fractions	🟦
8. Multiply and divide common fractions	🟦
9. Solve word problems with common fractions	🟨
Decimals	
10. Carry out arithmetic computations involving dollars and cents	🟦
11. Read and write decimals in one and more places	🟦
12. Round off decimals to one or more places	🟦
13. Multiply and divide decimals in one or more places	🟦
14. Add and subtract decimals in one or more places	🟦
15. Solve word problems with decimals in one or more places	🟨
Percent	
16. Read and write percents	🟦
17. Compute percents	🟦

Appendix D

Student Self-Ratings, Teacher Ratings, and Performance Test

OFFICE USE ONLY

Instrument No.: ______

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Student Self-Ratings

Directions: In the spaces provided, write your name, check (✓) your sex, write your teacher's name, check (✓) your area vocational center, and check (✓) your vocational training program.

Student Name: ________________________________ 1-3

Student Sex: ____ Male . . . . 1 ____ Female 2 4

Teacher Name: ________________________________ 5-6

Area Vocational Center:

___Danville VOTEC 1

___Decatur Area Vocational Center 2

___Sauk Area Career Center 3 7

___Other (please specify)______________ 4

TURN PAGE

Vocational Program Area/Training Program:

Agricultural Occupations 1

____Conservation 01
____Agricultural Mechanics 02
____Ornamental Horticulture 03
____Other (please specify)________________ 04

Business, Marketing, and Management Occupations 2

____Secretarial 01
____Business Data Processing Systems 02
____Computer Programming 03
____Other (please specify)________________ 04

Health Occupations 3

____Nurse Aide 01
____Practical Nursing 02
____Health Occupations Cooperative Education 03
____Other (please specify)________________ 04

8-10

Home Economics Occupations 4

____Food Management, Production, and Service 01
____Child Care 02
____Child Development 03
____Other (please specify)________________ 04

Industrial Occupations 5

____Construction and Building Trades 01
____Electronics 02
____Machine Shop 03
____Other (please specify)________________ 04

TURN PAGE

Directions: Indicate, by circling the number, how well you believe you can do ***each*** *of the following mathematics skills.*

Example:

Mathematics Skill	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
Read and write common fractions	1	2	[✓ 3]	4

	Degree of Skill				
Mathematics Skills	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
WHOLE NUMBERS					
1. Read, write, and count whole numbers					
examples:					
6, six					
54, fifty-four					
375, three hundred seventy-five					
4,128; four thousand one hundred twenty-eight	1	2	3	4	11
2. Add and subtract whole numbers					
examples:					
Add: $\begin{array}{r} 8 \\ \underline{+3} \end{array}$ $\begin{array}{r} 15,821 \\ 3,147 \\ \underline{+ \quad 195} \end{array}$ Subtract: $\begin{array}{r} 76 \\ \underline{-23} \end{array}$ $\begin{array}{r} 12,872 \\ \underline{- \quad 983} \end{array}$	1	2	3	4	12

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
3. Multiply and divide whole numbers *examples:* Multiply: $\begin{array}{r}80\\ \times\ 3\\ \hline\end{array}$ $\begin{array}{r}543\\ \times\ 81\\ \hline\end{array}$ Divide: $7/\overline{147}$ $125/\overline{34,318}$	1	2	3	4	13
4. Add, subtract, multiply, and divide whole numbers to solve word problems	1	2	3	4	14
5. Round off whole numbers	1	2	3	4	15
FRACTIONS					
6. Read and write common fractions *examples:* $\frac{1}{8}$, one-eighth $\frac{5}{4}$, five-fourths $3\frac{6}{7}$, three and six-sevenths	1	2	3	4	16

TURN PAGE

Mathematics Skills	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well	
7. Add and subtract common fractions examples: Add: $\begin{array}{r}\frac{2}{5}\\+\frac{1}{5}\\\hline\end{array}$ $\begin{array}{r}\frac{5}{8}\\+\frac{1}{3}\\\hline\end{array}$ $\begin{array}{r}10\frac{1}{2}\\+\ 4\frac{1}{4}\\\hline\end{array}$ Subtract: $\begin{array}{r}\frac{6}{7}\\-\frac{3}{7}\\\hline\end{array}$ $\begin{array}{r}\frac{5}{9}\\-\frac{1}{3}\\\hline\end{array}$ $\begin{array}{r}18\frac{2}{3}\\-15\frac{1}{6}\\\hline\end{array}$	1	2	3	4	17
8. Multiply and divide common fractions examples: Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $\begin{array}{r}12\\\times\ 4\frac{3}{5}\\\hline\end{array}$ Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\dfrac{9\frac{7}{15}}{4\frac{2}{5}}$	1	2	3	4	18
9. Add, subtract, multiply, and divide common fractions to solve word problems	1	2	3	4	19

TURN PAGE

Mathematics Skills

	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
DECIMALS					
10. Read and write decimals examples: .2, two-tenths .43, forty-three hundredths .875, eight hundred seventy-five thousandths .0964, nine hundred sixty-four ten thousandths	1	2	3	4	20
11. Add and subtract decimals examples: Add: $\begin{array}{r} .3 \\ .1 \\ \underline{+.2} \end{array}$ 125.2 + 38.3 + 16.8 .00789 + .00023 Subtract: $\begin{array}{r} .7 \\ \underline{-.2} \end{array}$ 320.8 - 18.6 124 - .009	1	2	3	4	21

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
12. Multiply and divide decimals examples: Multiply: $\begin{array}{r}.6\\ \underline{\times\ 3}\end{array}$ $\begin{array}{r}110\\ \underline{\times .854}\end{array}$ $1{,}425 \times 7.63$ Divide: $15/\overline{8.70}$ $75.2/\overline{128.764}$ $8 \div .004$	1	2	3	4	22
13. Add, subtract, multiply, and divide common decimals to solve word problems	1	2	3	4	23
14. Solve problems involving dollars and cents	1	2	3	4	24
15. Round off decimals	1	2	3	4	25

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
PERCENT					
16. Read and write percents examples: 32%, thirty-two percent $8\frac{1}{3}\%$, eight and one-third percent 115.6%, one hundred fifteen and six-tenths percent	1	2	3	4	26
17. Solve problems involving percents	1	2	3	4	27
MIXED OPERATIONS					
18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers	1	2	3	4	28
19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents	1	2	3	4	29

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
20. Find averages (means)	1	2	3	4	30
21. Do written calculations quickly	1	2	3	4	31
MEASUREMENT AND CALCULATION					
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4	32
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4	33
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4	34
25. Do basic metric conversions involving weight, distance, and volume	1	2	3	4	35
26. Solve problems involving time, weight, distance, and volume	1	2	3	4	36
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4	37

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
ESTIMATION				
28. Determine if a solution or answer to a mathematics problem is reasonable	1	2	3	4

STOP, YOU ARE FINISHED

Instrument No.: ____

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Teacher Ratings

Directions: *In the spaces provided, write the name of the student whom you are rating, check (_✓_) the student's sex, write your name, check (_✓_) your area vocational center, and check (_✓_) the vocational training program in which you teach.*

Student Name: ________________________________ 1-3

Student Sex: ____ Male . . . . 1 ____ Female 2 4

Teacher Name: ________________________________ 5-6

Area Vocational Center:

___Danville VOTEC 1
___Decatur Area Vocational Center 2
___Sauk Area Career Center 3 7
___Other (please specify)______________ 4

TURN PAGE

Vocational Program Area/Training Program:

Agricultural Occupations 1

____Conservation 01
____Agricultural Mechanics 02
____Ornamental Horticulture 03
____Other (please specify)________________ 04

Business, Marketing, and Management Occupations 2

____Secretarial 01
____Business Data Processing Systems 02
____Computer Programming 03
____Other (please specify)________________ 04

Health Occupations 3

____Nurse Aide 01
____Practical Nursing 02
____Health Occupations Cooperative Education 03 8-10
____Other (please specify)________________ 04

Home Economics Occupations 4

____Food Management, Production, and Service 01
____Child Care 02
____Child Development. 03
____Other (please specify)________________ 04

Industrial Occupations 5

____Construction and Building Trades 01
____Electronics 02
____Machine Shop 03
____Other (please specify)________________ 04

TURN PAGE

Directions: Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills.

Example:

Mathematics Skill	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
Read and write common fractions	1	2	[✓ 3]	4

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
WHOLE NUMBERS					
1. Read, write, and count whole numbers examples: 6, six 54, fifty-four 375, three hundred seventy-five 4,128; four thousand one hundred twenty-eight	1	2	3	4	11
2. Add and subtract whole numbers examples: Add: $\begin{array}{r} 8 \\ +3 \\ \hline \end{array}$ $\begin{array}{r} 15{,}821 \\ 3{,}147 \\ +\ \ 195 \\ \hline \end{array}$ Subtract: $\begin{array}{r} 76 \\ -23 \\ \hline \end{array}$ $\begin{array}{r} 12{,}872 \\ -\ \ 983 \\ \hline \end{array}$	1	2	3	4	12

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
3. Multiply and divide whole numbers examples: Multiply: $\begin{array}{r}80\\ \times\ 3\\ \hline\end{array}$ $\begin{array}{r}543\\ \times\ 81\\ \hline\end{array}$ Divide: $7/\overline{147}$ $125/\overline{34,318}$	1	2	3	4	13
4. Add, subtract, multiply, and divide whole numbers to solve word problems	1	2	3	4	14
5. Round off whole numbers	1	2	3	4	15
FRACTIONS					
6. Read and write common fractions examples: $\frac{1}{8}$, one-eighth $\frac{5}{4}$, five-fourths $3\frac{6}{7}$, three and six-sevenths	1	2	3	4	16

TURN PAGE

Mathematics Skills	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well	
7. Add and subtract common fractions examples: Add: $\begin{array}{r}\frac{2}{5}\\+\frac{1}{5}\\\hline\end{array}$ $\begin{array}{r}\frac{5}{8}\\+\frac{1}{3}\\\hline\end{array}$ $\begin{array}{r}10\frac{1}{2}\\+\ 4\frac{1}{4}\\\hline\end{array}$ Subtract: $\begin{array}{r}\frac{6}{7}\\-\frac{3}{7}\\\hline\end{array}$ $\begin{array}{r}\frac{5}{9}\\-\frac{1}{3}\\\hline\end{array}$ $\begin{array}{r}18\frac{2}{3}\\-15\frac{1}{6}\\\hline\end{array}$	1	2	3	4	17
8. Multiply and divide common fractions examples: Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $\begin{array}{r}12\\\times\ 4\frac{3}{5}\\\hline\end{array}$ Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\dfrac{9\frac{7}{15}}{4\frac{2}{5}}$	1	2	3	4	18
9. Add, subtract, multiply, and divide common fractions to solve word problems	1	2	3	4	19

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
DECIMALS					
10. Read and write decimals					
examples:					
.2, two-tenths					
.43, forty-three hundredths					
.875, eight hundred seventy-five thousandths					
.0964, nine hundred sixty-four ten thousandths	1	2	3	4	20
11. Add and subtract decimals					
examples:					
Add: $\begin{array}{r} .3 \\ .1 \\ \underline{+.2} \end{array}$ 125.2 + 38.3 + 16.8					
.00789 + .00023					
Subtract: $\begin{array}{r} .7 \\ \underline{-.2} \end{array}$ 320.8 - 18.6					
124 - .009	1	2	3	4	21

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
12. Multiply and divide decimals examples: Multiply: $\begin{array}{r} .6 \\ \underline{\times\ 3} \end{array}$ $\begin{array}{r} 110 \\ \underline{\times .854} \end{array}$ $1,425 \times 7.63$ Divide: $15/\overline{8.70}$ $75.2/\overline{128.764}$ $8 \div .004$	1	2	3	4	22
13. Add, subtract, multiply, and divide common decimals to solve word problems	1	2	3	4	23
14. Solve problems involving dollars and cents	1	2	3	4	24
15. Round off decimals	1	2	3	4	25

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
PERCENT					
16. Read and write percents examples: 32%, thirty-two percent $8\frac{1}{3}\%$, eight and one-third percent 115.6%, one hundred fifteen and six-tenths percent	1	2	3	4	26
17. Solve problems involving percents	1	2	3	4	27
MIXED OPERATIONS					
18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers	1	2	3	4	28
19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents	1	2	3	4	29

TURN PAGE

	Mathematics Skills	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well	
20.	Find averages (means)	1	2	3	4	30
21.	Do written calculations quickly	1	2	3	4	31
	MEASUREMENT AND CALCULATION					
22.	Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4	32
23.	Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4	33
24.	Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4	34
25.	Do basic metric conversions involving weight, distance,and volume	1	2	3	4	35
26.	Solve problems involving time, weight, distance, and volume	1	2	3	4	36
27.	Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4	37

TURN PAGE

Mathematics Skills	Degree of Skill				
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well	
ESTIMATION					
28. Determine if a solution or answer to a mathematics problem is reasonable	1	2	3	4	38

STOP, YOU ARE FINISHED

OFFICE USE ONLY

Instrument No.: ______

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Performance Test

Directions: In the spaces provided, write your name, check (_✓_) your sex, write your teacher's name, check (_✓_) your area vocational center, and check (_✓_) your vocational training program.

Student Name: ________________________________ 1-3

Student Sex: _____ Male . . . . 1 _____ Female 2 4

Teacher Name: ________________________________ 5-6

Area Vocational Center:

____Danville VOTEC 1
____Decatur Area Vocational Center 2
____Sauk Area Career Center 3 7
____Other (please specify)________________ 4

TURN PAGE

Vocational Program Area/Training Program:

Agricultural Occupations	1	
____Conservation	01	
____Agricultural Mechanics	02	
____Ornamental Horticulture	03	
____Other (please specify)____________	04	
Business, Marketing, and Management Occupations	2	
____Secretarial	01	
____Business Data Processing Systems	02	
____Computer Programming	03	
____Other (please specify)____________	04	
Health Occupations	3	
____Nurse Aide	01	
____Practical Nursing	02	
____Health Occupations Cooperative Education	03	8-10
____Other (please specify)____________	04	
Home Economics Occupations	4	
____Food Management, Production, and Service	01	
____Child Care	02	
____Child Development	03	
____Other (please specify)____________	04	
Industrial Occupations	5	
____Construction and Building Trades	01	
____Electronics	02	
____Machine Shop	03	
____Other (please specify)____________	04	

TURN PAGE

Directions; *Do* ***each*** *of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers.*

Example:

Add: $\begin{array}{r} 8 \\ \underline{+7} \end{array}$

(a) 6 (b) 25 [✓ (c)] 15 (d) 5

WHOLE NUMBERS

1. 97 is written as:
   - (a) nine hundred seven
   - (b) nine thousand seventy
   - (c) ninety-seven
   - (d) seventy-nine 11

2. 4,132 is written as:
   - (a) four thousand one hundred thirty-two
   - (b) forty-one thousand thirty-two
   - (c) forty-one hundred thirty
   - (d) four hundred thirty-two 12

TURN PAGE

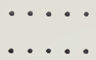
3. Eight is represented by which number?

(a) 8 (b) 6 (c) 800 (d) 80 13

4. Five thousand nine hundred nineteen is represented by which number?

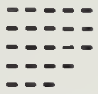
(a) 519 (b) 59 (c) 591 (d) 5,919 14

5. How many dots are there in the following diagram?



(a) 10 (b) 30 (c) 8 (d) 5 15

6. How many lines are there in the following diagram?



(a) 13 (b) 22 (c) 15 (d) 32 16

7. Add:

$$\begin{array}{r} 9 \\ +7 \\ \hline \end{array}$$

(a) 26 (b) 2 (c) 16 (d) 17 17

8. Add:

$$\begin{array}{r} 302 \\ 431 \\ +\ 58 \\ \hline \end{array}$$

(a) 791 (b) 792 (c) 691 (d) none of these 18

TURN PAGE

9. Add:

$$\begin{array}{r} 12{,}031 \\ 1{,}224 \\ 8{,}341 \\ +\quad 489 \\ \hline \end{array}$$

(a) 22,985 (b) 22,085 (c) 21,085 (d) 22,075 19

10. Subtract:

$$\begin{array}{r} 98 \\ -27 \\ \hline \end{array}$$

(a) 61 (b) 81 (c) 125 (d) 71 20

11. Subtract:

$$\begin{array}{r} 926 \\ -336 \\ \hline \end{array}$$

(a) 590 (b) 690 (c) 592 (d) 692 21

12. Subtract:

$$\begin{array}{r} 13{,}104 \\ -\quad 785 \\ \hline \end{array}$$

(a) 13,319 (b) 13,621 (c) 12,329 (d) none of these 22

13. Multiply:

$$\begin{array}{r} 37 \\ \times\ 8 \\ \hline \end{array}$$

(a) 276 (b) 296 (c) 306 (d) 302 23

14. Multiply:

$$\begin{array}{r} 40 \\ \times 29 \\ \hline \end{array}$$

(a) 1,160 (b) 1,189 (c) 1,260 (d) 1,060 24

TURN PAGE

15. Multiply: $\begin{array}{r} 789 \\ \underline{\times\ 46} \end{array}$

(a) 35,294 (b) 37,284 (c) 7,890 (d) 36,294 25

16. Divide:

$8/\overline{224}$

(a) 30 (b) 26 (c) 28 (d) 27 26

17. Divide:

$27/\overline{3,321}$

(a) 13 (b) 132 (c) 1,230 (d) none of these 27

18. Divide:

$326/\overline{44,018}$

(a) 135 (c) 105 R=148

(b) 135 R=8 (d) 135 R=80 28

19. Mr. Jones has 9 acres of farm land. He intends to buy 6 acres in the spring, 15 in the summer and 48 in the fall. How many acres will he have at the beginning of next Winter?

(a) 30 (b) 68 (c) 58 (d) 78 29

TURN PAGE

20. Ms. Smith typed 126 pages on Wednesday. On Thursday she typed 58 pages. How many more pages did Ms. Smith type on Wednesday than on Thursday?

(a) 68 (b) 184 (c) 78 (d) 168 30

21. Sixteen ounces of flour were called for in a recipe. If the recipe were doubled, how many ounces of flour would be needed?

(a) 16 (b) 28 (c) 32 (d) none of these 31

22. How many 3-feet square sections can be cut from a piece of sheet metal 3-feet wide by 30 feet long?

(a) 90 (b) 10 (c) 33 (d) 8 32

23. 64 rounded off to the nearest tens place is:

(a) 60 (b) 70 (c) 65 (d) 80 33

24. 1,553 rounded off to the nearest hundreds place is:

(a) 1,500 (b) 1,550 (c) 1,600 (d) 2,000 34

25. 23,974 rounded off the to the nearest thousands place is:

(a) 23,900 (b) 23,000 (c) 24,900 (d) 24,000 35

TURN PAGE

FRACTIONS

26. $\frac{1}{4}$ is written as:

(a) one-eighth (c) one-fourteenth

(b) one-fourth (d) one-fortieth 36

27. $\frac{7}{3}$ is written as:

(a) three-seventieths (c) three-sevenths

(b) seventy-thirds (d) seven-thirds 37

28. $2\frac{5}{8}$ is written as:

(a) twenty-five eighths (c) two and five-eighths

(b) two and eight-fifths (d) twenty-eight fifths 38

29. Four-fifths is written as:

(a) $\frac{4}{5}$ (b) $\frac{4}{50}$ (c) $\frac{5}{4}$ (d) none of these 39

30. Nine-sixths is written as:

(a) $\frac{6}{9}$ (b) $\frac{9}{6}$ (c) $\frac{90}{6}$ (d) $\frac{96}{6}$ 40

TURN PAGE

31. Four and eleven-eighteenths is written as:

(a) $\frac{411}{18}$ (b) $\frac{4}{1118}$ (c) $4\frac{11}{18}$ (d) $4\frac{11}{8}$ 41

32. Add:

$$\begin{array}{r} \frac{5}{8} \\ +\frac{2}{8} \\ \hline \end{array}$$

(a) $\frac{3}{8}$ (b) $\frac{5}{8}$ (c) $\frac{7}{8}$ (d) $\frac{7}{16}$ 42

33. Add:

$$\begin{array}{r} \frac{4}{6} \\ +\frac{2}{6} \\ \hline \end{array}$$

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 6 (d) 1 43

34. Add:

$$\begin{array}{r} \frac{3}{4} \\ +\ \frac{1}{8} \\ \hline \end{array}$$

(a) $\frac{7}{8}$ (b) $\frac{1}{2}$ (c) $\frac{3}{8}$ (d) $\frac{1}{3}$ 44

35. Add:

$$\begin{array}{r} \frac{1}{15} \\ +\ \frac{5}{6} \\ \hline \end{array}$$

(a) $\frac{7}{10}$ (b) $\frac{29}{30}$ (c) $\frac{23}{30}$ (d) none of these 45

TURN PAGE

36. Add:

$$\begin{array}{r} \frac{9}{10} \\ +\frac{7}{25} \\ \hline \end{array}$$

(a) $\frac{19}{50}$ (b) $1\frac{9}{50}$ (c) $\frac{9}{50}$ (d) $\frac{16}{35}$ 46

37. Add:

$$\begin{array}{r} 12\frac{7}{8} \\ +\ 5\frac{1}{6} \\ \hline \end{array}$$

(a) $17\frac{3}{24}$ (b) $17\frac{1}{24}$ (c) $18\frac{1}{24}$ (d) $17\frac{5}{24}$ 47

38. Subtract:

$$\begin{array}{r} \frac{8}{9} \\ -\frac{3}{9} \\ \hline \end{array}$$

(a) 5 (b) $\frac{11}{9}$ (c) $\frac{4}{9}$ (d) $\frac{5}{9}$ 48

39. Subtract:

$$\begin{array}{r} \frac{5}{6} \\ -\frac{3}{6} \\ \hline \end{array}$$

(a) 2 (b) $\frac{1}{3}$ (c) $\frac{11}{6}$ (d) $\frac{1}{6}$ 49

TURN PAGE

40. Subtract:

$$\begin{array}{r} \frac{8}{9} \\ -\frac{2}{3} \\ \hline \end{array}$$

(a) $\frac{4}{9}$ (b) $\frac{1}{3}$ (c) $\frac{2}{9}$ (d) 6 50

41. Subtract:

$$\begin{array}{r} 10\frac{1}{12} \\ -\ 4 \\ \hline \end{array}$$

(a) $5\ \frac{11}{12}$ (b) 6 (c) $5\ \frac{1}{2}$ (d) $6\ \frac{1}{12}$ 51

42. Subtract:

$$\begin{array}{r} 16\ \frac{7}{10} \\ -12\ \frac{2}{9} \\ \hline \end{array}$$

(a) $4\ \frac{1}{2}$ (b) $4\ \frac{43}{90}$ (c) $4\ \frac{44}{90}$ (d) none of these 52

43. Subtract:

$$\begin{array}{r} 34\ \frac{1}{10} \\ -12\ \frac{4}{15} \\ \hline \end{array}$$

(a) $21\ \frac{5}{6}$ (b) $20\ \frac{5}{6}$ (c) $20\ \frac{1}{6}$ (d) $21\ \frac{1}{6}$ 53

44. Multiply: $\frac{1}{4} \times \frac{1}{8}$

(a) $\frac{1}{22}$ (b) $\frac{1}{12}$ (c) $\frac{1}{32}$ (d) $1\ \frac{1}{2}$ 54

TURN PAGE

45. Multiply: $\frac{2}{5} \times \frac{4}{7}$

(a) $\frac{1}{2}$ (b) $\frac{6}{35}$ (c) $\frac{6}{7}$ (d) $\frac{8}{35}$ 55

46. Multiply: $\frac{5}{21} \times \frac{3}{35}$

(a) $\frac{1}{7}$ (b) $\frac{8}{56}$ (c) $\frac{1}{49}$ (d) none of these 56

47. Multiply: $8\frac{1}{6} \times 4\frac{2}{7}$

(a) $32\frac{1}{21}$ (b) 35 (c) $5\frac{5}{6}$ (d) $4\frac{2}{7}$ 57

48. Multiply: $\frac{3}{4} \times \frac{4}{9} \times \frac{6}{7}$

(a) $\frac{2}{7}$ (b) $\frac{13}{20}$ (c) $\frac{3}{14}$ (d) $\frac{1}{14}$ 58

49. Multiply:

$$\begin{array}{r} 48 \\ \times\ 3\frac{3}{4} \\ \hline \end{array}$$

(a) $1,443\frac{3}{4}$ (b) 144 (c) 180 (d) $144\frac{3}{4}$ 59

50. Divide: $\frac{5}{8} \div \frac{1}{4}$

(a) $\frac{2}{5}$ (b) $2\frac{1}{2}$ (c) $\frac{5}{32}$ (d) $5\frac{3}{5}$ 60

TURN PAGE

51. Divide: $\frac{3}{5} \div \frac{1}{10}$

(a) 6 (b) $\frac{3}{50}$ (c) $\frac{1}{3}$ (d) none of these 61

52. Divide: $\frac{5}{6} \div 2$

(a) $1\frac{2}{3}$ (b) $\frac{3}{5}$ (c) $2\frac{5}{6}$ (d) $\frac{5}{12}$ 62

53. Divide: $3\frac{1}{3} \div 2\frac{1}{2}$

(a) $8\frac{1}{3}$ (b) $1\frac{1}{3}$ (c) $6\frac{1}{6}$ (d) $5\frac{2}{5}$ 63

54. Divide: $\dfrac{\frac{3}{10}}{\frac{9}{10}}$

(a) $\frac{1}{9}$ (b) 9 (c) $\frac{9}{100}$ (d) $\frac{1}{3}$ 64

55. Divide: $\dfrac{5\frac{1}{7}}{2\frac{1}{4}}$

(a) $2\frac{2}{7}$ (b) $11\frac{4}{7}$ (c) $10\frac{4}{7}$ (d) $7\frac{11}{28}$ 65

TURN PAGE

56. A farmer removed 1/2 of all the corn in a silo and a week later removed 1/4 of the original amount of corn. What fractional part of the corn was removed from the silo?

(a) $\frac{1}{8}$ (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$ 66

57. A secretary typed an entire report on 5 3/4 pages. However, he/she was supposed to type the report on no more than 4 1/2 pages. How many extra pages did the secretary type?

(a) $2\frac{1}{2}$ (b) 1 (c) $10\frac{1}{4}$ (d) $1\frac{1}{4}$ 67

58. A dress needing repair was sewn 3/4" up a seam. However, the repair should have been made 3 times that length. How many inches should the repair have been made?

(a) $2\frac{1}{4}$ (b) $\frac{1}{4}$ (c) 2 (d) 4 68

59. A worker has two pieces of sheet metal. How many quarters will he/she have if each piece is cut into equal sizes?

(a) 2 (b) 4 (c) 8 (d) 12 69

TURN PAGE

60. .26 is written as:

(a) twenty-six tenths

(b) twenty-six hundredths

(c) twenty-six thousandths

(d) twenty-six 70

61. .0048 is written as:

(a) forty-eight thousandths

(b) forty-eight hundredths

(c) forty-eight ten thousandths

(d) four hundred and eighty 71

62. Seven-tenths is represented by which number?

(a) .7 (b) .07 (c) .007 (d) 7 72

63. Ten ten thousandths is represented by which number?

(a) 10,000 (b) .010 (c) .0001 (d) .0010 73

TURN PAGE

64. Add: $\begin{array}{r} .2 \\ .3 \\ +.4 \\ \hline \end{array}$

(a) .09 (b) .9 (c) 9 (d) .009 74

65. Add: $\begin{array}{r} .4 \\ .6 \\ +.9 \\ \hline \end{array}$

(a) 1.9 (b) 19 (c) .19 (d) .019 75

66. Add: $\begin{array}{r} 8.7 \\ 5.2 \\ +2.4 \\ \hline \end{array}$

(a) 15.13 (b) .163 (c) 1.63 (d) none of these 76

67. Add: 24 + 3.5 + .28

(a) 27.78 (b) 24.378 (c) 28 (d) 2.778 77

68. Add: 136.2 + 4.362 + 1.4 + .054

(a) 142.1016 (c) 142.016

(b) .00142016 (d) 136.8302 78

79-80/01
1-4 dup

TURN PAGE

69. Add: .00826 + .001931

(a) .0010191 (c) .02757

(b) .010191 (d) .002757 5

70. Subtract:

$$\begin{array}{r} .8 \\ \underline{-.3} \end{array}$$

(a) .5 (b) .05 (c) 5 (d) .24 6

71. Subtract:

$$\begin{array}{r} 9.2 \\ \underline{-6.4} \end{array}$$

(a) 3.8 (b) 38 (c) 2.8 (d) .28 7

72. Subtract:

$$\begin{array}{r} 45.032 \\ \underline{-\ 7.63} \end{array}$$

(a) 38.662 (b) 37.662 (c) 38.402 (d) 37.402 8

73. Subtract: 26 - 4.82

(a) 22.18 (b) 21.18 (c) 21.82 (d) none of these 9

74. Subtract: 498.3 - 4.983

(a) 0 (b) 492.317 (c) 493.317 (d) 493.1283 10

TURN PAGE

75. Subtract: 252 - .004

(a) 248 (b) 242.006 (c) 252.004 (d) 251.996 11

76. Multiply:

$$\begin{array}{r} .8 \\ \times\ 3 \\ \hline \end{array}$$

(a) 2.4 (b) .24 (c) 24 (d) .024 12

77. Multiply:

$$\begin{array}{r} 34.5 \\ \times\ \ .26 \\ \hline \end{array}$$

(a) .897 (b) 897 (c) 89.7 (d) 8.97 13

78. Multiply:

$$\begin{array}{r} 100 \\ \times .432 \\ \hline \end{array}$$

(a) .432 (b) 43.2 (c) 4.32 (d) .00432 14

79. Multiply: .25 × .25

(a) .0625 (b) .625 (c) 6.25 (d) none of these 15

80. Multiply: 18.2 × 3.64

(a) 662.48 (b) 6624.8 (c) 66.248 (d) .66248 16

81. Multiply: 1500 × 6.75

(a) 101.25 (b) .10125 (c) 10.125 (d) 10,125 17

TURN PAGE

82. Divide: $14/\overline{7.28}$

(a) 5.2 (b) 52 (c) .52 (d) .052 18

83. Divide: $4/\overline{.0024}$

(a) 6 (b) .006 (c) .6 (d) .0006 19

84. Divide: $6/\overline{3}$

(a) .5 (b) 50 (c) .05 (d) 5 20

85. Divide: $.25/\overline{1.6125}$

(a) 645 (b) 6.45 (c) .0645 (d) .00645 21

86. Divide: $86.8/\overline{140.616}$

(a) 1.62 (b) .162 (c) 16.2 (d) none of these 22

87. Divide: $.022 \div 4$

(a) .5 (b) .005 (c) .0055 (d) .05 23

TURN PAGE

88. Joe removed .5 of all the flowers from a box and Cindy removed .3 of the original number of flowers. What decimal part of the flowers was removed from the box?

(a) .2 (b) 8 (c) .8 (d) .08 24

89. Mr. Best sold .24 of the suits he wanted to sell at his clothing store one day. What decimal part of his suits still need to be sold?

(a) 76 (b) .76 (c) 7.6 (d) 24 25

90. A patient needs to take 2.75 ounces of medicine per day. After 5 days, how many ounces of medicine will the patient have taken?

(a) 13.75 (b) 1.375 (c) .1375 (d) 137.5 26

91. A carpenter has 1 board of lumber. If he/she cuts the board into 10 equal pieces, what decimal part would one piece be?

(a) .01 (b) 10 (c) 1 (d) .1 27

92. Add:

$$\begin{array}{r} \$14.26 \\ \$\ \ 3.31 \\ \$\ \ \ .98 \\ +\$\ \ \ .07 \\ \hline \end{array}$$

(a) $7.62 (b) $8.62 (c) $17.62 (d) $18.62 28

93. Celery seeds cost $.59 per pack, lettuce seeds cost $.54 per pack, and carrot seeds cost $.48 per pack. What is the cost if one of each pack of seeds is bought?

(a) $1.61 (b) $16.10 (c) $.16 (d) $2.61 29

TURN PAGE

94. Subtract: $24.31
-$ 5.42

(a) $29.73 (b) $18.89 (c) $28.89 (d) $19.73 30

95. Mrs. Perez paid for $15.26 worth of groceries with a twenty dollar bill. How much change should she receive?

(a) $5.74 (b) $5.84 (c) $4.74 (d) $4.84 31

96. Multiply: $24.99
x 3

(a) $74.97 (b) $749.07 (c) $.74 (d) $7.49 32

97. If paint costs $12.49 per gallon, how much would fourteen gallons cost?

(a) $124.90 (b) $17.48 (c) $49.96 (d) $174.86 33

98. Divide: 25/$2.00

(a) $80 (b) $8 (c) $.08 (d) $.80 34

99. Ten pounds of nails cost $12.40. How much would one pound cost?

(a) $1.24 (b) $.12 (c) $.24 (d) $22.40 35

TURN PAGE

100. .84 rounded off to the nearest tenths place is:

(a) .8 (b) .9 (c) .85 (d) .83 36

101. .9829 rounded off to the nearest thousandths place is:

(a) .982 (b) .983 (c) .9820 (d) .98 37

102. .00175 rounded off to the nearest ten thousandths place is:

(a) .0017 (b) .0020 (c) .00176 (d) .0018 38

TURN PAGE

103. 48% is written as:

(a) forty percent

(b) four hundred eighty percent

(c) forty-eight percent

(d) eighty-four percent 39

104. 125.5% is written as:

(a) one hundred twenty-five and five-tenths percent

(b) one thousand two hundred fifty-five percent

(c) twenty-five and five-tenths percent

(d) one hundred twenty-five percent 40

105. $9\frac{3}{4}\%$ is written as:

(a) ninety-three fourths percent

(b) nine and three-fourths percent

(c) nine and four-thirds percent

(d) ninety-four thirds percent 41

TURN PAGE

106. Seventy-five percent is represented by which of the following?

(a) 70% (b) 75% (c) 85% (d) 57% 42

107. Six and nine-tenths percent is represented by which of the following?

(a) $\frac{69}{10}\%$ (b) 6910% (c) 6.9% (d) none of these 43

108. One hundred fifty-six and one-half percent is represented by which of the following?

(a) $156\frac{1}{2}\%$ (b) 156.1% (c) 156% (d) $10056\ \frac{1}{2}\%$ 44

109. 8 is what percent of 32?

(a) 33% (b) 25% (c) 50% (d) 75% 45

110. 75% of 48 is:

(a) 12 (b) 24 (c) 36 (d) 48 46

111. 40 is 20% of what number?

(a) 60 (b) 100 (c) 20 (d) none of these 47

TURN PAGE

MIXED OPERATIONS

112. $\frac{4}{5}$ changed to a decimal is:

(a) 4% (b) $\frac{1}{5}$ (c) .75 (d) .80 48

113. 30% changed to a fraction is:

(a) $\frac{3}{100}$ (b) $\frac{3}{10}$ (c) $\frac{1}{30}$ (d) .03 49

114. $\frac{5}{8}$ changed to a percent is:

(a) $62\frac{1}{2}\%$ (b) 625% (c) $6.2\frac{1}{2}\%$ (d) none of these 50

115. 92% changed to a decimal is:

(a) .092 (b) 92 (c) 9.2 (d) .92 51

116. .023 changed to a percent is:

(a) 23% (b) 23 (c) 2.3% (d) .23% 52

117. $\frac{1}{2}$ changed to a decimal is:

(a) .50 (b) .05 (c) 50 (d) .2 53

TURN PAGE

118. $6\frac{3}{5}$ changed to a decimal is:

(a) .066 (b) 66 (c) .66 (d) none of these 54

119. .75 changed to a fraction is:

(a) $\frac{1}{4}$ (b) .50 (c) $\frac{3}{4}$ (d) $\frac{5}{7}$ 55

120. 2.45 changed to a fraction is:

(a) $\frac{1}{245}$ (b) $2\frac{4}{5}$ (c) $2\frac{9}{20}$ (d) 24.5% 56

121. A machine produces 150 items per hour. If one morning run of four hours gave 24 defective items, what percent of items produced were defective?

(a) 4% (b) 16% (c) 6.25% (d) 2% 57

122. A farmer harvested 100 bushels of corn on Monday, 85 bushels on Tuesday, and 40 bushels on Wednesday. If he/she wants to harvest 300 bushels of corn by Thursday, what part of the corn still needs to be harvested?

(a) .75 (b) .25 (c) .50 (d) .10 58

123. If 1,000 bricks are needed to build a wall and only 650 are on the work site, what part of the bricks needed are available?

(a) $\frac{7}{10}$ (b) $\frac{13}{10}$ (c) $\frac{13}{20}$ (d) $\frac{7}{20}$ 59

TURN PAGE

124. Find the average (mean) of the following numbers: 55, 31, 26, 48

(a) 35 (b) 160 (c) 40 (d) 80 60

125. Find the average (mean) of the following numbers: 12.1, 8.9, 16.5

(a) 12.5 (b) 13.5 (c) 11.5 (d) 14 61

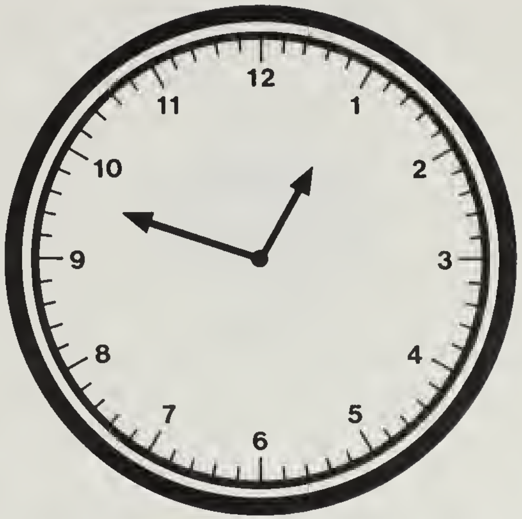
126. A salesperson sold $80.50 of clothing on Monday, $100.27 on Tuesday, $93.76 on Wednesday, $85.24 on Thursday, and $125.08 on Friday. What was his/her average sales per day?

(a) $76.97 (b) $96.97 (c) $116.97 (d) $93.76 62

TURN PAGE

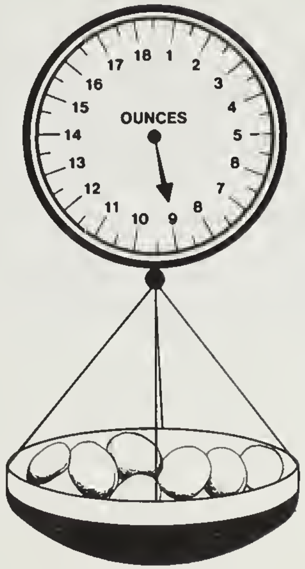
MEASUREMENT AND CALCULATION

127. What time is shown on the clock?



(a) 12:50 (b) 12:52 (c) 12:48 (d) 12:43 63

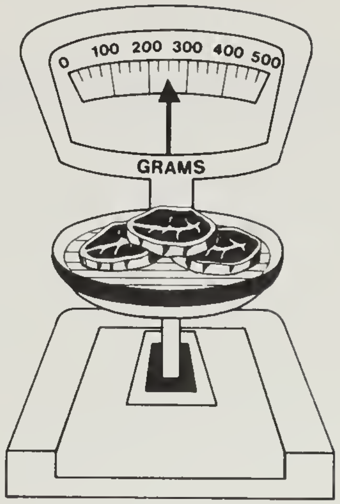
128. How much do the vegetables weigh?



(a) 9 ounces (b) 8 ounces (c) 10 ounces (d) 11 ounces 64

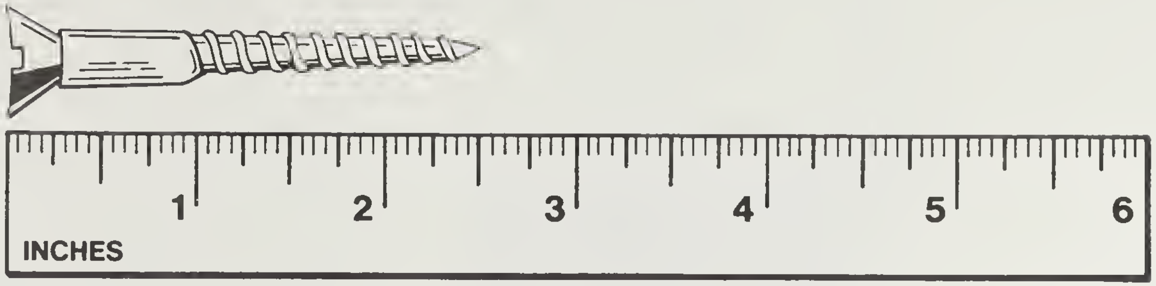
TURN PAGE

129. How much does the meat weigh?



(a) 200 grams (b) 300 grams (c) 225 grams (d) 250 grams 65

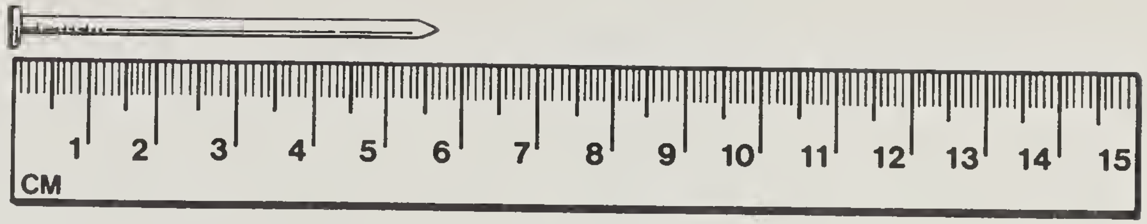
130. What is the length of the screw to the nearest quarter inch?



(a) 2" (b) $2\frac{1''}{2}$ (c) $2\frac{3''}{4}$ (d) 3" 66

TURN PAGE

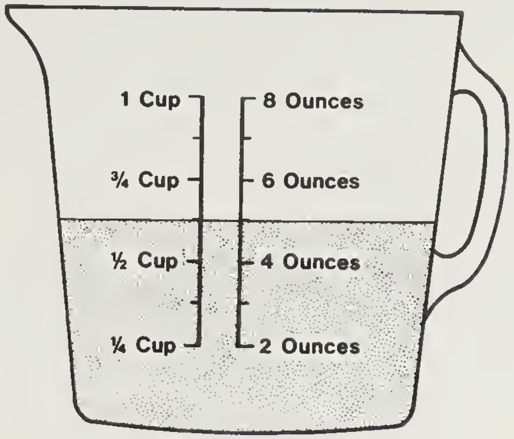
131. How long is the nail to the nearest tenth of a centimeter?



(a) 5.5 centimeters (c) 5.7 centimeters

(b) 5 centimeters (d) 6 centimeters 67

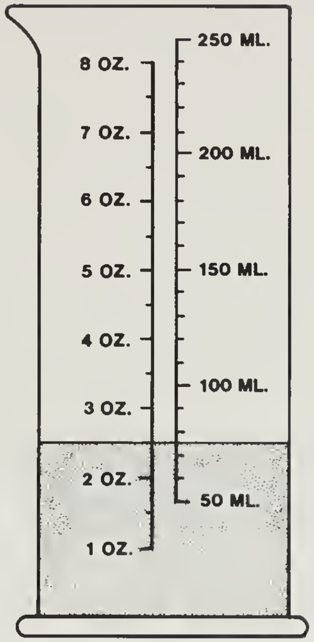
132. What is the volume of milk?



(a) 2 ounces (b) 3 ounces (c) 4 ounces (d) 5 ounces 68

TURN PAGE

133. What is the volume of water?



(a) 50 ml. (b) 75 ml. (c) 100 ml. (d) 200 ml. 69

134. .25 kilograms are equal to:

(a) $\frac{1}{250}$ gram (c) 2,500 grams

(b) 25 grams (d) 250 grams 70

135. 11 pounds are equal to:

(a) 5 kilograms (c) 50 grams

(b) 50 kilograms (d) 500 grams 71

TURN PAGE

136. 10 centimeters are equal to:

(a) 1 meter (b) .1 meter (c) .01 meter (d) none of these 72

137. 5 inches are equal to:

(a) 127 millimeters (c) 10 millimeters

(b) .127 millimeters (d) 127 centimeters 73

138. 2 liters are equal to:

(a) 2 milliliters (c) 2,000 milliliters

(b) 20 milliliters (d) 200 milliliters 74

139. 1.06 quarts are equal to:

(a) 4 milliliters (c) 1 milliliter

(b) 4 liters (d) 1 liter 75

140. A farmer began plowing a field at 5:35 a.m. He/she finished 13 hours and 8 minutes later. What time was it when the farmer finished plowing the field?

(a) 6:35 p.m. (c) 5:35 p.m.

(b) 6:43 p.m. (d) 6:35 a.m. 76

TURN PAGE

141. A customer bought 10 pounds of pork chops, 6 pounds 8 ounces of steak, 1 pound of bacon, and 4 pounds 15 ounces of chicken. How much meat did the customer buy?

(a) 21 pounds 7 ounces (c) 44 pounds

(b) 23 pounds (d) none of these 77

142. A patient weighs 100 kilograms, but needs to lose 25 kilograms. How much will the patient weigh when he/she loses the necessary weight?

(a) 125 kilograms (c) 125 pounds

(b) 75 kilograms (d) 100 kilograms 78

79-80/02
1-4 dup

143. If one wall stud is 8 feet long and there are 12 studs in a wall, how many linear feet of lumber (assuming zero waste) will a carpenter need for all the studs in the wall?

(a) 20 feet (b) 56 feet (c) 96 feet (d) 106 feet 5

144. A piece of pipe is 12 meters long. If the pipe is cut into 4 equal pieces, what would be the length of each piece (assuming zero waste)?

(a) 8 meters (c) 16 meters

(b) 3 meters (d) none of these 6

TURN PAGE

145. A cook needs ten 8-ounce cartons of milk for a recipe. How many quarts of milk would be used?

(a) 80 quarts (c) 5 quarts

(b) 10 quarts (d) 2.5 quarts 7

146. After a car traveled 260 miles its tank was refilled with 10.4 liters of gasoline. How many miles per liter did the car get?

(a) 25 (b) 20 (c) 30 (d) 27 8

TURN PAGE

147. A secretary organized his/her work and determined that it will take 25 minutes to type letters, 2 hours to type a mailing list, 45 minutes to proofread a manuscript, and 1 1/2 hours to do file work. While none of the following answers is correct, which answer is a reasonable estimate of the time it will take to do the work?

(a) about 3 hours
(b) about 6 $\frac{1}{2}$ hours
(c) about 8 hours
(d) about 4 hours 45 minutes 9

148. A welder has 1 1/2 feet of welding rod but he/she needs 3 times that amount to complete a job. While none of the following answers is correct, which answer is a reasonable estimate of the amount of welding rod needed to complete the job?

(a) about 3 feet
(b) about 4 $\frac{3}{4}$ feet
(c) about 7 feet
(d) about 10 feet 10

149. On a given day a machine shop earns $480 and pays $183.50 in overhead costs. While none of the following answers is correct, which answer is a reasonable estimate of the profit made by the machine shop?

(a) about $250.50
(b) about $663.50
(c) about $290.00
(d) about $350.00 11

TURN PAGE

150. A child drank 451 milliliters of milk on Monday, 675 milliliters on Tuesday, and 524 milliliters on Wednesday. While none of the following answers is correct, which answer is a reasonable estimate of the average (mean) amount of milk the child drank per day?

(a) about 545 milliliters (c) about 483 milliliters

(b) about 650 milliliters (d) about 800 milliliters

STOP, YOU ARE FINISHED

Appendix E

Area Vocational Center Follow-up Letter

University of Illinois at Urbana-Champaign

College of Education
DEPARTMENT OF VOCATIONAL
AND TECHNICAL EDUCATION

345 Education Building
1310 S. Sixth Street
Champaign, IL 61820
(217) 333-0807

March 2, 1984

Dr. Ronald Foreman, Director
Sauk Area Career Center
138th and Crawford Avenue
Crestwood
P.O. Robbins, IL 60472

Dear Ron:

I want to thank you for your cooperation and assistance while conducting the recent field testing at Sauk Area Career Center. You and your staff were very helpful and cordial during my visit, and contributed to the successful field testing.

I will keep you informed regarding future project activities. Thanks again!

Sincerely,

Jim

James P. Greenan
Principal Investigator

JPG/cja

Appendix F

Sample Computer Program

```
COMPUTING SERVICES OFFICE                                    84/06/06.    23.35.03.     PAGE     1
UNIVERSITY OF ILLINOIS
S P S S - - STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES

VERSION 8.3 (NOS) -- MAY 04, 1982

203700 CM MAXIMUM FIELD LENGTH REQUEST


       RUN NAME        STUDENT PERFRMNC TEST RELIABLTIES
       VARIABLE LIST   PTEST,P101,P104,P105,P107,PVPA,P108,P111 TO P178,P179,
                       P201,P205 TO P278,P279,P301,P305 TO P313
       SUBFILE LIST    CONS (21) SECY (20) NRSAID (20) FOOD (20) BLDTRD (20)
                       AGMECH (21) DP (22) LPN (20) CHLDCR (20) ELECT (20)
                       ORNHORT (09) COMP (19) HLTH (16) CHLDDEV (19) MACHINE (15)
       INPUT MEDIUM    DISK
       INPUT FORMAT    (F1,T1,F3,F1,F2,F1,F1,T8,F3,68F1,F2/
                       F4,74F1,F2/
                       F4,9F1)

      ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

      VARIABLE  FORMAT  RECORD    COLUMNS

      PTEST     F 1. 0       1      1-    1
      P101      F 3. 0       1      1-    3
      P104      F 1. 0       1      4-    4
      P105      F 2. 0       1      5-    6
      P107      F 1. 0       1      7-    7
      PVPA      F 1. 0       1      8-    8
      P108      F 3. 0       1      8-   10
      P111      F 1. 0       1     11-   11
      P112      F 1. 0       1     12-   12
      P113      F 1. 0       1     13-   13
      P114      F 1. 0       1     14-   14
      P115      F 1. 0       1     15-   15
      P116      F 1. 0       1     16-   16
      P117      F 1. 0       1     17-   17
      P118      F 1. 0       1     18-   18
      P119      F 1. 0       1     19-   19
      P120      F 1. 0       1     20-   20
      P121      F 1. 0       1     21-   21
      P122      F 1. 0       1     22-   22
      P123      F 1. 0       1     23-   23
      P124      F 1. 0       1     24-   24
      P125      F 1. 0       1     25-   25
      P126      F 1. 0       1     26-   26
      P127      F 1. 0       1     27-   27
```

Appendix G

Sample Computer Output

```
      RESPONSES/ITEM          5
      KEY-COUNT             150
      TITLE-COUNT             1
      RECORDS/CASE            3
      FORMAT ITEM-COUNT     150
      NO PARAMETER ERRORS WERE FOUND, PROCESSING WILL START

MAY  22, 1984                 * * *   MERMAC -- TEST ANALYSIS AND QUESTIONNAIRE PACKAGE   * * *                          2


                                               ITEM ANALYSIS PERFORMANCE TEST


                                                 SUMMARY OF TEST STATISTICS

                                         NUMBER OF ITEMS                          150

                                         MEAN SCORE                             98.93

                                         MEDIAN SCORE                           99.38

                                         STANDARD DEVIATION                     26.38

                                         RELIABILITY (KR-20)                    0.968

                                         RELIABILITY (KR-21)                    0.958

                                         S.E. OF MEASUREMENT                     4.73

                                         POSSIBLE LOW SCORE                         0
                                         POSSIBLE HIGH SCORE                      150

                                         OBTAINED LOW SCORE                        28
                                         OBTAINED HIGH SCORE                      150

                                         NUMBER OF SCORES                         359
                                              BLANK SCORES                          0
                                              INVALID SCORES                        0
                                              VALID SCORES                        359

MAY  22, 1984                 * * *   MERMAC -- TEST ANALYSIS AND QUESTIONNAIRE PACKAGE   * * *                          3


                                               ITEM ANALYSIS PERFORMANCE TEST


                                                TEST FREQUENCY DISTRIBUTION

 RAW   STANDARD   PER                         CUM
SCORE   SCORE   CENTILE  PERCENT   FREQ      FREQ
                                                          EACH * REPRESENTS  1 PERSON(S)
 150     694      99       0.3       1       359          *
 149     690      99       0.0       0       358
 148     686      99       0.0       0       358
 147     682      99       0.0       0       358
```

Appendix H

Sample Data Table

INTERNAL CONSISTENCY RELIABILITY COEFFICIENTS (KUDER-RICHARDSON [KR-20]) OF THE PERFORMANCE TEST OF GENERALIZABLE MATHEMATICS SKILLS

ASSESSMENT INSTRUMENT				
(n=21)	(SEM=4.66)	(KR-20=.98)	Conservation	PROGRAM
(21)	4.82	.95	Agricultural Mechanics	
(9)	4.56	.90	Horticulture	
(20)	4.56	.97	Secretarial	
(22)	3.78	.93	Data Processing	
(19)	4.28	.97	Computer Programming	
(20)	4.54	.97	Nurse Aide	
(20)	4.10	.94	Practical Nursing	
(16)	4.82	.94	Health Occupations Cooperative Education	
(20)	4.79	.95	Food Management, Production, and Service	
(20)	4.75	.96	Child Care	
(19)	4.86	.93	Child Development	
(20)	4.68	.96	Construction and Building Trades	
(20)	4.29	.96	Electronics	
(15)	4.56	.98	Machinist	
(111)	3.97	.99	Male	GENDER
(171)	4.02	.99	Female	
(128)	4.32	.97	High	MATHEMATICS APTITUDE
(136)	4.45	.96	Medium	
(18)	4.16	.95	Low	
(282)	4.73	.97		TOTAL

Appendix I

Generalizable Mathematics Skills
Assessment Survey

University of Illinois at Urbana-Champaign

College of Education
DEPARTMENT OF VOCATIONAL
AND TECHNICAL EDUCATION

345 Education Building
Urbana, Illinois 61801
(217) 333-0807

July 28, 1983

Rick Laleman, Director
Bloomington Area Vocational Center
1202 East Locust Street
Bloomington, Illinois 61701

Dear Rick:

The "Generalizable Skills" project funded by the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education (DAVTE) is currently in its second phase. This year the project is concerned with developing strategies and procedures for assessing the mathematics skills of students in secondary vocational programs. The expectation of the project is that the secondary area vocational centers will have practical instruments and procedures that teachers and other school personnel can use to identify students' functional learning abilities and problems in the area of mathematics. The assessment information could provide a basis upon which to prescribe the necessary instruction and/or support services necessary for students to succeed in their vocational programs.

Your leadership, cooperation, and assistance last year greatly contributed to the project's success. The project staff and the DAVTE would appreciate your participation and assistance again in this year's study. Your continued leadership and support will greatly help us in the task of developing and validating the project's assessment strategies and procedures.

Enclosed is a survey and a stamped, self-addressed envelope which I would like you to complete. The survey generally is concerned with describing the existing mathematics assessment and instructional strategies/procedures currently used in the AVC's. I would appreciate it if you would complete and return your survey to me by August 14, 1983. You may designate a person to complete the survey (e.g., mathematics teacher, guidance counselor, support services personnel) if appropriate. This information will help us in adding to our knowledge base, and planning and conducting future project activities. Thank you in advance for your cooperation and assistance. If you have any questions, please don't hesitate to contact me.

Sincerely,

Jim Greenan

James P. Greenan
Assistant Professor and
Principal Investigator

JPG:skt:2s
Enc.

Generalizable Mathematics Skills Assessment Survey

Directions: Please provide the information requested by placing check marks (✓) and writing in the spaces below. The information will assist the 'Generalizable Skills' project staff by adding to the mathematics skills assessment knowledge base, and in planning and conducting future project activities.

1. Does your area vocational center (AVC) instructional personnel (e.g., vocational teachers, guidance counselors, support personnel) have access to assessment information that describes an individual student's level of mathematics skills?

____ yes ____ no

2. What kinds of instruments, strategies, and/or procedures are used to assess the levels of mathematics skills of students enrolled in your AVC?

____ Standardized mathematics tests

(specify) ________________________________

____

____ Teacher developed mathematics tests

(describe) ________________________________

____

____ Other

(specify) ________________________________

____

____ None

3. Who conducts or administers assessments of students' mathematics skills?

____ Comprehensive high school personnel

(specify: e.g., mathematics teacher) ____________________

____

____ AVC personnel

(specify: e.g., vocational teacher) ____________________

____

____ Other personnel

(specify) ____________________

____

____ No one

4. Is there a need in your AVC for practical instruments, strategies, and procedures designed to assess the mathematics skills that are necessary for students to succeed in vocational programs?

____ yes ____ no

Explain: ____________________

____

____

____

____

____

____

____

5. Specify how mathematics skills assessment information could be effectively used in the instructional process by AVC personnel for helping students to succeed in vocational programs?

Assessment: ______

Planning: ______

Curriculum: ______

Instruction: ______

Evaluation: ______________________________

6. Who provides mathematics instruction to students in your AVC?

____ Comprehensive high school personnel

(specify: e.g., mathematics teacher) ______________________________

____ AVC personnel

(specify: e.g., vocational teacher) ______________________________

____ Other personnel

(specify) ______________________________

____ No one

7. Describe the process *(if any)* for identifying, referring, and/or providing instruction and support services to students who need instruction or additional assistance in mathematics to succeed in their vocational programs?

8. You may comment or provide any additional, helpful information regarding mathematics skills assessment in your AVC.

UNIVERSITY OF ILLINOIS-URBANA

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